

1973-1975



CATALOG ISSUE



CALIFORNIA POLYTECHNIC STATE UNIVERSITY

ANNOUNCEMENTS

SAN LUIS OBISPO

GUIDE TO ACADEMIC PROGRAMS

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Series 53, No. 7, July 1973. Published monthly by California Polytechnic State University at San Luis Obispo, California 93407. Entered as second class matter August 9, 1918, at the Post Office of San Luis Obispo, California, under the Act of August 24, 1912.



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ACADEMIC CALENDAR—1973-74

1973

JUNE						
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Classes



Examinations

Summer Quarter, 1973

June 18	Monday	Beginning of university year Beginning of summer quarter Registration for summer quarter
June 19	Tuesday	Summer quarter classes begin
June 26	Tuesday	Last day to enroll for summer quarter Last day to add courses
July 10	Tuesday	Last day to withdraw from classes without penalty
July 4	Wednesday	Academic holiday—Independence Day
August 7	Tuesday	End of seventh week
August 24	Friday	Last day of classes
August 27-30	Monday-Thursday	Final examination period
August 30	Thursday	End of summer quarter
Aug. 31-Sept. 16	Friday-Sunday	Academic holiday

Fee-Supported Summer Session, 1973

June 18 to	June 22	Pre-session
First Session	Second Session	
June 25	July 23	Registration for all students
June 26	July 24	Summer Sessions classes begin
June 27	July 25	Last day to enroll for 2-week term
June 28	July 26	Last day to enroll for 4-week term Last day to add or drop courses without penalty
July 4		Independence Day—academic holiday
July 7	August 3	End of 2-week term
July 21	August 17	End of 4-week term
August 20 to	August 24	Post-session

Final examinations to be held during the last day of classes.

1973

SEPTEMBER						
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Fall Quarter, 1973

September 17	Monday	Beginning of fall quarter (faculty only)
September 20	Thursday	Registration for new students
September 21	Friday	Registration for continuing and returning students
September 24	Monday	Fall quarter classes begin
October 1	Monday	Last day to enroll for fall quarter Last day to add courses
October 12	Friday	Last day to withdraw from classes without penalty
October 22	Monday	Academic holiday—Veteran's Day
November 12	Monday	End of seventh week
November 21–25	Wednesday–Sunday	Academic holiday—Thanksgiving
December 7	Friday	Last day of classes
December 10–13	Monday–Thursday	Final examination period
December 13	Thursday	End of fall quarter
Dec. 14–January 2	Friday–Wednesday (noon)	Academic holiday

1974

JANUARY

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Winter Quarter 1974

January 2-3	Wed. (noon)- Thursday	Registration for winter quarter
January 4	Friday	Winter quarter classes begin
January 11	Friday	Last day to enroll for winter quarter
		Last day to add courses
January 24	Thursday	Last day to withdraw from classes without penalty
February 18	Monday	Academic holiday—Washington's Birthday
February 22	Friday	End of seventh week
March 13	Wednesday	Last day of classes
March 14-19	Thursday-Tuesday	Final examination period
March 19	Tuesday	End of winter quarter
March 20-27	Wednesday-Wednesday	Academic holiday

Spring Quarter 1974

March 28-29	Thursday-Friday	Registration for spring quarter
April 1	Monday	Spring quarter classes begin
April 8	Monday	Last day to enroll for spring quarter
		Last day to add courses
April 12	Friday (noon)	Academic holiday (noon)
April 19	Friday	Last day to withdraw from classes without penalty
April 26	Friday	Last day to apply for June commencement
May 15	Wednesday	End of seventh week
May 27	Monday	Academic holiday—Memorial Day
June 10	Monday	Last day of classes
June 11-14	Tuesday-Friday	Final examination period
June 15	Saturday	Commencement
		End of spring quarter
		End of university year (faculty only)
June 16-18	Sunday-Tuesday	Academic holiday

ACADEMIC CALENDAR—1974-75

1974

JULY							AUGUST							SEPTEMBER								
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28	29	30	31					25	26	27	28	29	30	31		29	30					

Summer Quarter 1974

June 19	Wednesday	Beginning of university year Beginning of summer quarter Registration for summer quarter
June 20	Thursday	Summer quarter classes begin
June 27	Thursday	Last day to enroll for summer quarter Last day to add courses
July 4	Thursday	Academic holiday—Independence Day
July 11	Thursday	Last day to withdraw from classes without penalty
August 8	Thursday	End of seventh week
August 27	Tuesday	Last day of classes
August 28-31	Wednesday-Saturday	Final examination period
August 31	Saturday	End of summer quarter
September 1-15	Sunday-Sunday	Academic holiday

Fee-Supported Summer Sessions 1974

June 17 to	June 21	Pre-session
First Session	Second Session	
June 24	July 22	Registration for all students
June 25	July 23	Summer session classes begin
June 26	July 24	Last day to enroll—two-week term
June 27	July 25	Last day to enroll—four-week term Last day to add or drop courses without penalty
July 4		Academic holiday—Independence Day
July 6	August 2	End of two-week term
July 20	August 16	End of four-week term
August 19 to	August 23	Post-session

Summer session final examinations to be held during the last day of classes.

OCTOBER							NOVEMBER							DECEMBER							
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27	28	29	30	31			24	25	26	27	28	29	30	29	30	31					

Fall Quarter 1974

September 16	Monday	Beginning of fall quarter (faculty only)
September 19	Thursday	Registration for new students
September 20	Friday	Registration for continuing and returning students
September 23	Monday	Fall quarter classes begin
September 30	Monday	Last day to enroll for fall quarter Last day to add courses
October 11	Friday	Last day to withdraw from classes without penalty
October 28	Monday	Academic holiday—Veterans Day
November 11	Monday	End of seventh week
Nov. 27– December 1	Wednesday– Sunday	Academic holiday—Thanksgiving
December 6	Friday	Last day of classes
December 9–12	Monday–Thursday	Final examination period
December 12	Thursday	End of fall quarter
December 13– January 2	Friday–Thursday (noon)	Academic holiday

Winter Quarter 1975

January 2–3	Thursday (noon)– Friday	Registration for winter quarter
January 6	Monday	Winter quarter classes begin
January 13	Monday	Last day to enroll for winter quarter Last day to add courses
January 24	Friday	Last day to withdraw from classes without penalty
February 17	Monday	Academic holiday—Washington's Birthday
February 24	Monday	End of seventh week
March 13	Thursday	Last day of classes
March 14–18	Friday–Tuesday	Final examination period
March 18	Tuesday	End of winter quarter
March 19–23	Wednesday–Sunday	Academic holiday

1975

JANUARY

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Spring Quarter 1975

March 24-25	Monday-Tuesday	Registration for spring quarter
March 26	Wednesday	Spring quarter classes begin
March 28	Friday (noon)	Academic holiday (noon)
April 2	Wednesday	Last day to enroll for spring quarter Last day to add courses
April 15	Tuesday	Last day to withdraw from classes without penalty
April 18	Friday	Last day to apply for June commencement
May 14	Wednesday	End of seventh week
May 26	Monday	Academic holiday—Memorial Day
June 6	Friday	Last day of classes
June 9-12	Monday-Thursday	Final examination period
June 14	Saturday	Commencement End of spring quarter
June 15-17	Sunday-Tuesday	End of university year (faculty only) Academic holiday

Tentative Summer Quarter 1975

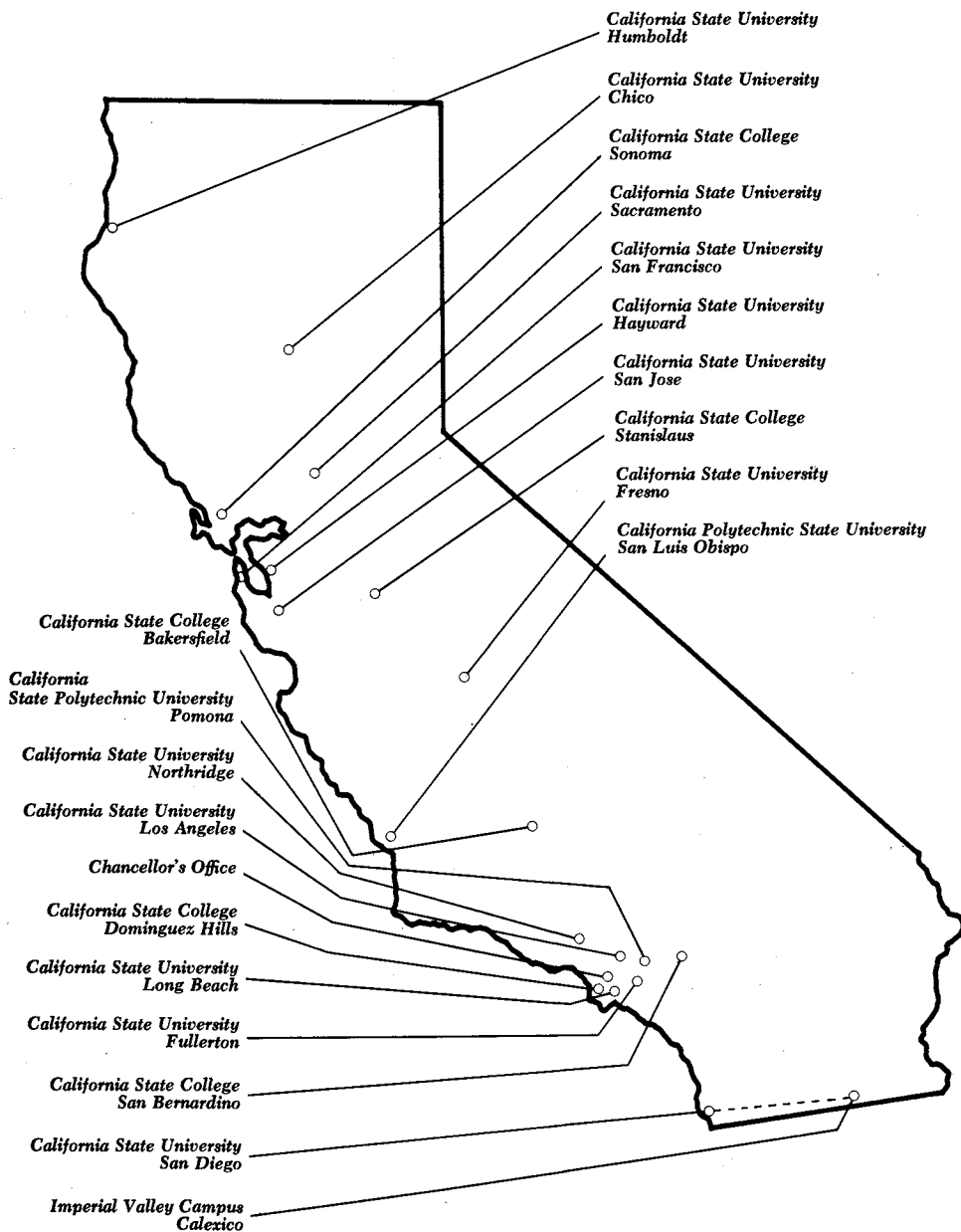
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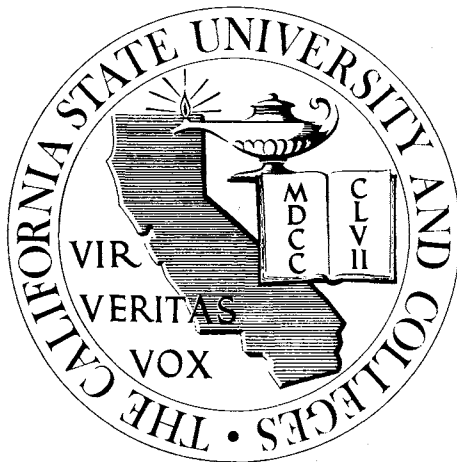
June 18	Wednesday	Beginning of university year Beginning of summer quarter Registration for summer quarter
June 19	Thursday	Summer quarter classes begin
June 26	Thursday	Last day to enroll for summer quarter
		Last day to add courses
July 10	Thursday	Last day to withdraw from classes without penalty
July 4	Friday	Academic holiday—Independence Day
August 7	Thursday	End of seventh week
August 26	Tuesday	Last day of classes
August 27–30	Wednesday–Saturday	Final examination period
August 30	Saturday	End of summer quarter
Aug. 31–September 21	Sunday–Sunday	Academic holiday



**THE CALIFORNIA STATE UNIVERSITY
AND COLLEGES**

THE CALIFORNIA STATE UNIVERSITY AND COLLEGES





THE CALIFORNIA STATE UNIVERSITY AND COLLEGES

The individual California State Colleges were brought together as a system by the Donahoe Higher Education Act of 1960. In 1972 the system became The California State University and Colleges and fourteen of the nineteen campuses received the title *University*.

The oldest campus—California State University, San Jose—was founded in 1857 and became the first institution of public higher education in California. The newest campus—California State College, Bakersfield—began instruction in 1970.

Responsibility for The California State University and Colleges is vested in the Board of Trustees, whose members are appointed by the Governor. The Trustees appoint the Chancellor, who is the chief executive officer of the system, and the Presidents, who are the chief executive officers on the respective campuses.

The Trustees, the Chancellor and the Presidents develop systemwide policy, with actual implementation at the campus level taking place through broadly based consultative procedures. The Academic Senate of The California State University and Colleges, made up of elected representatives of the faculty from each campus, recommends academic policy to the Board of Trustees through the Chancellor.

The nineteen campuses of The California State University and Colleges are financed primarily through funding provided by the taxpayers of California. For the 1973/74 year, the total cost of operation is \$555.1 million, which provides continuing support for 233,290 full-time equivalent (FTE) students. This results in an average cost per FTE student of \$2,379 per year. Of this amount, the average student pays \$225. Included in this average student payment is the amount paid by nonresident students. The remaining \$2,154 in costs are funded by State and federal taxes.

Academic excellence has been achieved by The California State University and Colleges through a distinguished faculty, whose primary responsibility is superior teaching. While each campus in the system has its own unique geographic and curricular character, all campuses, as multipurpose institutions, offer undergraduate and graduate instruction for professional and occupational goals as well as broad liberal education. All of the campuses require for graduation a basic program of "General Education—Breadth Requirements" regardless of the type of bachelor's degree or major field selected by the student. A limited number of doctoral degrees is offered jointly with the University of California.

Presently, under the system's "New Approach to Higher Education," the campuses are implementing a wide variety of innovative programs to meet the changing needs of students and society. Among pilot programs under way are off-campus degree programs, weekend colleges, self-paced learning programs, and special testing programs to accelerate student progress toward a degree.

Enrollments in fall 1972 totaled 278,000 students, who were taught by a faculty of 15,500. Last year the system awarded over 55 percent of the bachelor's degrees and 35 percent of the master's degrees granted in California. Almost 360,000 persons have been graduated from the nineteen campuses since 1960.

ADMINISTRATION, CALIFORNIA STATE UNIVERSITY AND COLLEGES

EX-OFFICIO TRUSTEES

Hon. Ronald Reagan	State Capitol, Sacramento 95814
Governor of California and President of the Trustees	
Hon. Ed Reinecke	State Capitol, Sacramento 95814
Lieutenant Governor of California	
Hon. Bob Moretti	State Capitol, Sacramento 95814
Speaker of the Assembly	
Hon. Wilson C. Riles	721 Capitol Mall, Sacramento 95814
State Superintendent of Public Instruction	
Dr. Glenn S. Dumke	5670 Wilshire Blvd., Los Angeles 90036
Chancellor of the California State University and Colleges	

APPOINTED TRUSTEES

Appointments are for a term of eight years expiring March 1 of the years in parentheses. Names are listed in order of appointment to the Board.

Charles Luckman (1974)	9200 Sunset Blvd., Los Angeles 90069
Daniel H. Ridder (1975)	604 Pine Ave., Long Beach 90801
George D. Hart (1975)	111 Sutter St., San Francisco 94104
Edward O. Lee (1974)	2000 Center Street, Berkeley 94704
Karl L. Wentz (1976)	5565 Tesla Road, Livermore 94550
W. O. Weissich (1977)	1299 4th St., San Rafael 94901
Robert A. Hornby (1978)	P.O. Box 60043, Terminal Annex, Los Angeles 90060
Wendell W. Witter (1979)	45 Montgomery St., San Francisco 94106
Mrs. Winifred H. Lancaster (1977)	P.O. Drawer JJ, Santa Barbara 93102
Gene M. Benedetti (1978)	8990 Poplar Ave., Cotati 94952
Robert F. Beaver (1976)	254 East 27th St., Los Angeles 90011
Roy T. Brophy (1980)	2160 Royale Rd., Suite 20, Sacramento 95815
Mrs. C. Stewart Ritchie (1980)	1064 Creek Dr., Menlo Park 94025
Frank P. Adams (1981)	235 Montgomery St., San Francisco 94104
Richard A. Garcia (1979)	P.O. Box 2073, Glendale 91209
Dean S. Leshner (1981)	P.O. Box 5166, Walnut Creek 94596

OFFICERS OF THE TRUSTEES

Governor Ronald Reagan
President

George D. Hart
Chairman

W. O. Weissich
Vice Chairman

Chancellor Glenn S. Dumke
Secretary-Treasurer

Office of the Chancellor	5670 Wilshire Boulevard
The California State University and Colleges	Los Angeles, California 90036
Glenn S. Dumke	Chancellor
H. E. Brakebill	Executive Vice Chancellor
Norman L. Epstein	Vice Chancellor and General Counsel
D. Dale Hanner	Vice Chancellor, Business Affairs
Harry Harmon	Vice Chancellor, Physical Planning and Development
C. Mansel Keene	Vice Chancellor, Faculty and Staff Affairs
William B. Langsdorf	Vice Chancellor, Academic Affairs

THE CALIFORNIA STATE UNIVERSITY AND COLLEGES

California State University, San Jose (1857).....	John H. Bunzel, President
125 South Seventh Street, San Jose, California 95114	(408) 277-2000
California State University, Chico (1887).....	Stanford Cazier, President
First and Normal Streets, Chico, California 95926	(916) 345-5011
California State University, San Diego (1897).....	Brage Golding, President
5402 College Avenue, San Diego, California 92115	(714) 286-5000
California State University, San Francisco (1899).....	Paul F. Romberg, President
1600 Holloway Avenue, San Francisco, California 94132	(415) 469-9123
California Polytechnic State University (1901).....	Robert E. Kennedy, President
San Luis Obispo, California 93407	(805) 546-0111
California State University, Fresno (1910).....	Norman A. Baxter, President
Shaw and Cedar Avenues, Fresno, California 93710	(209) 487-9011
California State University, Humboldt (1913).....	
Arcata, California 95521	(707) 826-3011
California State Polytechnic University (1938)	
Kellogg-Voorhis, Pomona.....	Robert C. Kramer, President
3801 West Temple Avenue, Pomona, California 91768	(714) 598-4141
California State University, Los Angeles (1947).....	John A. Greenlee, President
5151 State University Drive, Los Angeles, California 90032	(213) 224-0111
California State University, Sacramento (1947).....	James Bond, President
6000 Jay Street, Sacramento, California 95819	(916) 454-6011
California State University, Long Beach (1949).....	Stephen Horn, President
6101 East 7th Street, Long Beach, California 90804	(213) 498-4111
California State University, Fullerton (1957).....	L. Donald Shields, President
800 N. State College Boulevard, Fullerton, California 92634	(714) 870-2011
California State University, Hayward (1957).....	Ellis E. McCune, President
25800 Hillary Street, Hayward, California 94542	(415) 884-3000
California State University, Northridge (1958).....	James W. Cleary, President
18111 Nordhoff Street, Northridge, California 91324	(213) 885-1200
California State College, Stanislaus (1959).....	Carl Gatlin, President
800 Monte Vista Avenue, Turlock, California 95380	(209) 634-9101
California State College, Sonoma (1960).....	Thomas H. McGrath, President
1801 East Cotati Avenue, Rohnert Park, California 94928	(707) 795-2011
California State College, Dominguez Hills (1960).....	Leo F. Cain, President
1000 E. Victoria Street, Dominguez Hills, California 90246	(213) 532-4300
California State College, San Bernardino (1960).....	John M. Pfau, President
5500 State College Parkway, San Bernardino, California 92407	(714) 887-6311
California State College, Bakersfield (1967).....	
9001 Stockdale Highway, Bakersfield, California 93309	(805) 833-2011



GENERAL INFORMATION



EDUCATION AT CAL POLY

As one of the 19 campus in the State System, California Polytechnic State University, San Luis Obispo, offers educational programs in agriculture, applied arts, applied sciences, architecture, engineering, and preparation for elementary and secondary school teaching. Historically, Cal Poly's method of education and dedication to occupational-centered curricula has created for the University a distinctive role in higher education in California. It is particularly noted for its emphasis on agriculture, business, engineering, and home economics, together with the closely-related supporting fields of natural sciences, physical sciences, and mathematics.

Although the basic purpose is to prepare students to meet the requirements of specific occupations, Cal Poly is also dedicated to helping the individual to achieve his or her maximum personal development. Each student pursues a program of required general education courses, and through an extensive co-curricular program receives an opportunity to combine specialized instruction with preparation for citizenship, leadership, and constructive community living. Students are also encouraged to obtain actual experience through individual and group projects, work-study programs, and internships. Faculty members, who are selected on the basis of academic qualifications, professional experience, and teaching ability, are encouraged to maintain a constant interplay between general principles and practical applications in all instruction, whether in the laboratory, classroom or field study.

In each curricular program, the student begins work in the major field of his choice during the freshman year. A concurrent sequence of general education and elective courses assists the student in relating this chosen area of study to other fields of knowledge. Practical educational experiences in the major field prepare the student for specific occupations and professions or advanced study. Additional details of curricula appear in the sections describing each school and department. Student and faculty participation in the development and improvement of both curricular and co-curricular programs characterizes Cal Poly's mode of operation.

HISTORICAL DEVELOPMENT

California Polytechnic State University began with the establishment in 1901 by the State Legislature of a vocational high school at San Luis Obispo. The institution served as a forerunner in vocational education for agriculture and industry in California. In 1921 its Board of Trustees was dissolved and the State Board of Education administered the school until July 1, 1961 when administration passed to the Trustees of the California State University and Colleges.

Cal Poly began offering junior college courses in 1927, and became a two- and three-year institution in 1933. In 1936 a degree transfer program was added, and in 1940 the first bachelor of science degrees were authorized.

The first baccalaureate exercises were held in 1942. Approval to grant the master of arts degree in education was received in 1949, and to grant the master of science degree in 1967.

From 1933 until his retirement in 1966, the late Dr. Julian A. McPhee was chief administrator of Cal Poly. On May 1, 1967 the Trustees of the California State University and Colleges named Dr. Robert E. Kennedy as president of Cal Poly.

Approximately 12,000 students are enrolled at Cal Poly in some 50 academic programs. Included are men and women students from all California counties, most of the 50 states, and a number of foreign countries.

The future growth of the University is provided for by master plans for both academic and physical development approved by the Trustees. Support by the people of California through the Legislature and the Trustees insures the continuation of a distinctive polytechnic program in higher education.

THE CAMPUS

The Cal Poly campus consists of over 5,000 acres adjacent to San Luis Obispo, a community of 30,000 located on U.S. Highway 101, midway between San Francisco and Los Angeles, and 12 miles from the beaches and marine facilities of California's Central Coast.

Due to the varied nature of Cal Poly's curricula, instructional facilities are diverse and suited to the up-to-date demands of modern technology. In addition to faculty offices, classrooms, and laboratories for instructional use, the campus is served by several specialized facilities, particularly in agriculture, architecture, engineering, and the sciences.

Cal Poly has long been known as a friendly college which welcomes visitors to its campus. Maps suitable for a self-conducted tour are available from the information desk of the Administration Building for interested prospective students and parents and others. In addition, the campus provides three educational tours for which printed guides are available. These include a campus tree walk, dairy tour, and a tour of the unique Shakespeare Press Museum. Arrangements for group visits to the campus may be made by contacting the Director, Information Services and/or the office of the dean of the respective academic school.

FACILITIES

The outstanding agricultural programs of the University utilize such facilities as the Alan A. Erhart Agriculture building (which includes modern laboratories for animal husbandry, accounting, crops, dairy, farm management, and ornamental horticulture); several Agricultural Engineering shops (including farm mechanics, farm machinery, farm power, hydrology, rural electricity); the Food Processing building (which includes a creamery, meat laboratory, canning and freezing laboratories, and an instructional retail facility); soil science and veterinary science laboratories in the Science building; and an unexcelled complex of agricultural production units which are utilized instructionally in Cal Poly's student enterprise projects.

These agricultural units include a beef unit with feeding barns; 3800 acres of cattle range and pasture; a judging pavilion; a complete feed mill with storage facilities; a crops unit which includes washing, crating, and packing areas; and 750 acres of vegetable and field crops plus 30 acres of fruit and vine crops. Dairy unit includes a milking barn, feed barns, judging pavilion, and a complete creamery. In addition, a student project unit provides for 80 head of student-owned dairy project cattle. The horse unit includes barns, paddocks, and pasture for thoroughbred and quarter horses. A recently completed ornamental horticulture unit provides the most modern propagation and instructional facilities of their kind in the nation. Additional agricultural units are utilized instructionally for sheep, swine, and poultry production.

The instructional philosophy of the University as reflected in the extensive and modern agricultural facilities has also been incorporated in programs of engineering and technology, science, mathematics, graphic communications, physical education, home economics, and other areas in which Cal Poly has developed a reputation for excellence. These include laboratories for all phases of engineering such as aeronautical, electronic, environmental and industrial, mechanical, welding technology, and engineering technology.

A new computer science building provides computer capabilities for all instructional programs, particularly those in engineering, science, and mathematics. Two large science buildings provide fully equipped laboratories devoted to instruction in bacteriology, botany, chemistry, entomology, marine biology, microbiology, physics, plant pathology, and zoology.

Individual drafting and study cubicles in architectural laboratories give a distinctive appearance to new drafting classrooms as well as to some of the campus historical buildings which have been remodeled by the students themselves to provide design facilities in the School of Architecture and Environmental Design.

The Campus

Campus facilities include, in addition to a 500-seat theater, a language laboratory, and home economics and child development laboratories. The graphic arts building, which houses the journalism program, student newspaper, and radio station, includes the graphic communications department which ranges from the unique Shakespeare Press Museum to the most modern computer typesetting equipment for printing instruction.

The physical education facilities of the campus are extensive. The men's gymnasium provides wrestling, and gymnastic rooms in addition to the main floor which contains three full-length cross-court basketball courts and seats 4,000 persons for athletic contests. Handball and tennis courts are adjacent to the gymnasium, along with a large playing field area for intramural sports and physical education classes. Two heated swimming pools are used both for physical education classes and for varsity water polo and swimming. The football stadium has a grandstand and bleachers seating 7,000 persons. There is also a spacious baseball field with permanent seating, and a 9-lane all-weather quarter-mile track. There is also a women's physical education building utilized for minor sports as well as for special women's physical education requirements.

The four-story Administration building and Julian A. McPhee University Union serve all campus personnel.

The program of the Walter F. Dexter Memorial Library is designed to meet the curricular resource needs of students and the instructional and research needs of the faculty. The collections in excess of 800,000 cataloged and unclassified items include 300,000 cataloged volumes, approximately 25,000 bound periodicals, 275,000 microforms, and 200,000 unbound documents, pamphlets, and miscellaneous materials. The Library receives regularly 2,400 periodical and 2,500 other serial titles, and it is an official depository for United States Government and California State publications. Bookstacks located throughout the Library are open to all readers, and professionally trained librarians assist students and faculty in the use of the Library's resources.



SPECIAL INSTRUCTIONAL SERVICES

INSERVICE TRAINING IN AGRICULTURE

Cal Poly plays an active role in the inservice training of teachers of vocational agriculture by providing instructional staff and facilities for workshops and training programs co-operatively sponsored by the University and the State Bureau of Agricultural Education.

The campus provides an annual one-week summer skills program. The content varies, depending upon the needs and desires of the teachers as these are expressed through the Bureau of Agricultural Education. University faculty members provide up-to-date training in the technical phases of agriculture and also contribute to the professional improvement of teachers by offering instruction in teaching methods.

The annual summer conference of the California Agricultural Teachers Association is held at the campus with an attendance of 400-500 persons. Facilities, special speakers, exhibits, and other services are provided.

SERVICES TO VOCATIONAL AGRICULTURE

Services to vocational agriculture departments in the secondary schools of California are provided by the campus staff through such activities as: visiting vocational agriculture departments to discuss with teachers and students dairy, animal husbandry, deciduous and citrus fruits, field and truck crops, poultry, farm mechanics, farm management, and other problems; writing for agricultural magazines; assisting high school vocational agriculture departments to solve educational and agricultural problems through correspondence; judging of livestock, poultry, crops and other products at fairs; furnishing of breeding stock and hatching eggs to improve herds and flocks owned by Future Farmers throughout the State; and preparing a variety of teaching aids. These services are provided through a co-operative arrangement with the Bureau of Agricultural Education.

Other services to vocational agriculture are rendered by the Instructional Materials Program sponsored by the University to create a variety of visual aids for educational use.

SUMMER SESSIONS

The summer sessions are designed to meet the needs of regularly enrolled and visiting students and of teachers and others who wish to improve their professional competence. The campus offers two four-week summer sessions, a one-week pre-session and a one-week post session. The course offerings are broad, leading to various degrees and credentials, as well as providing for continuing professional development in many fields.

Admission to the summer sessions does not require completion of the matriculation process. Registration in the summer session does not insure the privilege of enrollment in one of the regular quarters. Graduate students should consult the *Graduate Study Bulletin* regarding requirements for classified status and applicability of credit toward their degree objectives.

The summer sessions are supported by fees collected from the students who enroll in the courses. There is no application fee for summer sessions. Requests for application forms, information on course offerings and regulations should be addressed to the Associate Dean, Continuing Education.

EXTENSION PROGRAM

A variety of extension courses is offered to assist in meeting the educational needs of the residents of its extension service area (San Luis Obispo, Santa Barbara, and southern Monterey Counties). Courses are arranged in an area when student demand is adequate to finance the instruction. Extension program offerings may be full quarter classes or special interest seminars or workshops of shorter duration.

Prospective extension students need not apply for admission to the University. Enrollment in an extension course does not imply admission as a matriculated

Instructional Services

student for any quarter. A listing of Extension programs and courses is published quarterly and is available from the Associate Dean, Continuing Education.

The maximum extension credit which may be accepted towards the bachelor's degree is 36 quarter units. No more than 9 quarter units of extension work may be counted towards the master's degree.



CONFERENCES AND WORKSHOPS

The University provides facilities, faculty and staff for programs of special design appropriate to its education objectives. These professional short courses, workshops and conferences have included such titles as: Physical Education Workshop; American Institute of Floral Design Symposium; American Association of Physics Teachers Regional Conference; Multi-County Workshop for Teachers of Migratory Children; California Nurserymen's Refresher Course; FFA Conference; California Mathematics Council Conference; American Studies Association State Conference; California Association of Refrigeration Engineers Society Conference; Western Regional Joint Conference of the American Fisheries Society and the Wildlife Society; California Catfish Farmers Association Convention and the Agricultural Leadership Training Program.

EDUCATIONAL OPPORTUNITY PROGRAM

The campus participates in the Education Opportunity Program jointly sponsored by Federal and State agencies for residents of California. Designed to help minority and low income students obtain a college education, it provides financial assistance, tutoring, curriculum advisement, counseling, and vocational guidance services. Cal Poly's curricula are especially attractive to students interested in its programs with emphasis on technological careers. California State University and College entrance requirements may be waived for a limited number of high school graduates and college transfers. Agencies authorized to nominate students for the program include high schools, community colleges, the Veterans Administration, and certain State agencies. For more information contact the Educational Opportunity Program Office.

INTERNATIONAL EDUCATION

The University is involved in a number of International Education programs, both on campus and overseas. In addition to participating in the study abroad programs of the State University and Colleges and of the American Association of State Colleges and Universities, Cal Poly provides technical assistance overseas through a contractual relationship with the Agency for International Development, U.S. Department of State. Overseas projects have been undertaken in Africa, Asia, and Latin America.

The program also includes on-campus training for students from foreign countries through an AID participant training contract and contracts with international organizations and foreign governments.

STUDY ABROAD

Cal Poly students are active in a study abroad program offered by The California State University and Colleges International Programs, under which students enroll for a full academic year simultaneously at their home campus, where they earn academic credit and maintain campus residency, and at a distinguished foreign university or a special program center.

Cooperating universities abroad include the University of Provence, France; the University of Heidelberg, Germany; the University of Florence, Italy; the Universidad Ibero-Americana, Mexico; the University of Uppsala, Sweden; the University of Madrid and the University of Granada, Spain; Tel Aviv University and the Hebrew University of Jerusalem, Israel; and Waseda University, Japan. In the United Kingdom, cooperating universities, which may vary from year to year, include Dundee, Leicester, London, Oxford, and Sheffield. In addition, California State University and Colleges students may attend a special program in Taiwan, Republic of China, or an architectural program in Copenhagen, Denmark.

Eligibility is limited to students who will have upper division or graduate standing during their year of participation, who have a B (3.0) average or better in at least 30 semester or 45 quarter units in any two previous consecutive years; show ability to adapt to a new environment; and, in the cases of France, Germany, Mexico and Spain, are proficient in the language of instruction at the foreign university. Selection is made by a faculty committee on the students' home campus and by a statewide faculty committee.

The International Programs are supported by state funds to the extent that such funds would have been expended had the student concerned continued to study in California. Students assume costs for pre-departure orientation, insurance, transportation, housing and meals. Home campus registration fees, tuition on the home campus for out-of-state students (if the student is not a California resident) and personal incidental expenses or vacation travel costs while abroad are also paid for by the student. The Office of International Programs collects and administers funds for those items which the program must arrange or can negotiate more effectively: typically, home campus fees, orientation costs, insurance, outbound transportation, and housing in some centers. Students accepted in the International Programs may apply for any financial aid available at their home campus.

Application for the 1974-75 academic year must be submitted before February 4, 1974 (except for United Kingdom applicants who must submit applications by January 7, 1974). Applicants are notified of acceptance by April 1, 1974. Detailed information may be obtained from the Cal Poly International Education Office or by writing to The California State University and Colleges International Programs, 5670 Wilshire Boulevard, Los Angeles, California 90036.

THE FOUNDATION

Organized in 1940, the California Polytechnic State University Foundation is a non-profit corporation. With faculty and administrative personnel as directors, the foundation has assumed the responsibility for financing and recording the project operations, operating and managing the cafeterias and bookstore, and providing other services to students, staff and faculty.

The foundation operates under lease agreements made with the Trustees of the California State University and Colleges and approved by the State Department of Finance. The provisions of these leases define the activities of the foundation and the use of its funds. The accounts are audited by the Department of Finance.

Through the foundation there is available a revolving fund from which students may borrow to finance their projects. No cosigner is required for a student to borrow from the foundation, but he must present a working plan, a budget, and a signed contract with the foundation before starting a project. Each student contributes a share from his earnings towards the project fund. Any losses in student projects are covered by the foundation from the fund contributed by project operators.

Typical agricultural projects include: Fattening steers, lambs, or swine; raising and breeding cattle, both beef and dairy, for a start towards future herds; growing crop projects, such as tomatoes, sweet corn, hay, and sugar beets; raising poultry, both meat birds and laying hens, and operating the hatchery; growing and marketing ornamental horticulture projects.

Group and individual projects are also conducted by students in engineering, technology, and science. Projects have become increasingly interdisciplinary.

THE ALUMNI ASSOCIATION

The Cal Poly Alumni Association serves all of the more than 35,000 students who have attended California Polytechnic State University, San Luis Obispo, since 1901.

The Association endeavors to maintain communication with former students and to coordinate alumni gatherings for educational purposes, reunions and other functions at the campus and in areas throughout California and the United States.

An international president and two vice-presidents, elected for two-year terms, aided by the secretary-treasurer and the campus director of alumni affairs, provide leadership for the organization which functions in California through directors in 16 sections of the State.

The Association currently is in a growth period and membership includes 3,000 life members and 1,000 annual members.

The Association currently produces a quarterly publication, organizes off-campus seminars, supports alumni activities at Homecoming and Poly Royal and sponsors special events for students on campus. Through contributions to loan and scholarship funds, it provides assistance to current students.

The Association also serves as a means for former students to contribute to the advancement programs of the University.

ADMISSIONS AND REGISTRATION



ADMISSION REQUIREMENTS

Admission to California Polytechnic State University is open to qualified graduates of any high school and to other applicants who, in the judgment of the appropriate campus authorities, possess equivalent preparation. Admission is limited to those applicants for whom adequate staff and facilities are available.

Guidance tests which are completed by incoming students are a part of the matriculation process and are given for the purpose of providing information for the student, his departmental adviser, and the counseling center. The departmental adviser uses guidance test results to assist in determining the courses most suited to the student's needs. These tests are not entrance examinations.

Students may elect to be absent any one quarter without filing an application for readmission.

Transcripts and records presented for admission or evaluation will become a part of the students' permanent records upon completion of matriculation.

Transfer Credit and Residence Requirements

Persons who have attended community colleges or four-year colleges will be given full credit for such college level courses as may be applicable to the pattern of course work in the California Polytechnic State University curriculum followed, and in general elective credit for those not so applicable. Credit earned in non-accredited colleges and universities will be accepted toward graduation requirements only after the student has completed 36 quarter units in residence with a C average.

Not more than 70 semester units (105 quarter units) may be allowed for credit taken in a community college. No credit may be allowed for professional courses in education taken in a community college.

A maximum of 36 quarter units of appropriate extension course credit may be applied toward the bachelor's degree.

No limit is placed upon the number of transferable credits from a four-year college or university, except that no student will be granted a bachelor's degree in any of the various curricula with less than 50 quarter units in residence at least 30 of which must be among the last 40 units counted toward the degree.

Individuals transferring from colleges or universities will be considered for admission only on a conditional basis at California Polytechnic State University if they have been on probation at the college or university last attended.

Evaluation of in-service military training will be made on the basis of American Council on Education recommendations.

Declaration of Major and Matriculation

The complete process of being admitted to Cal Poly as a candidate for a certificate, degree or credential requires that the student complete a matriculation process. This process at Cal Poly requires completion of application forms, payment of the application fee, submission of college aptitude test results, statement of residence, and transcripts of previous academic training.

All students applying for admission to undergraduate lower division or upper division programs, or to graduate studies, are required to declare a major or graduate degree objective. Applicants for admission as graduate students and candidates for teaching credentials must also meet additional requirements specified in the *Graduate Studies Bulletin* or the "Standard Teaching Credential Requirements" bulletin.

Application Procedure

All prospective students, except returning students who have been absent less than two quarters, must file a completed application for admission within the appropriate filing period. A completed undergraduate application includes Part A, the application form; Part B, the data form; and the non-refundable application fee of \$20.00. A graduate application includes Part A; Part B; Part C, the supplemental graduate admission application; and the non-refundable application fee of \$20.00. Graduate applicants who were enrolled as undergraduate students at Cal Poly in the term immediately preceding the term for which they now wish to apply must also complete all the required forms and submit the \$20.00 application fee. Each applicant may file only one application for any one term within the California State University and College system. The application should be filed with the college of first choice. Alternate choice campuses may be listed on the application.

Application Filing Periods for 1974-75

Quarter	Initial Filing Period	Extended Filing Period Begins (continues until quotas are reached)
Summer 1974.....	February 1974	March 1, 1974
Fall 1974.....	November 1973	December 1, 1973
Winter 1975.....	June 1974	July 1, 1974
Spring 1975.....	August 1974	September 1, 1974

Application Filing Periods for 1975-76

Summer 1975.....	February 1975	March 1, 1975
Fall 1975.....	November 1974	December 1, 1974
Winter 1976.....	June 1975	July 1, 1975
Spring 1976.....	August 1975	September 1, 1975

Initial Filing Period

All applications received during the initial filing period receive equal consideration within established enrollment categories and quotas, irrespective of the time and date they are received.

Space Reservations

Applicants who can be accommodated within category quotas will receive confirmation of space reservation. Although the space reservation is not a statement of admission, it is a commitment on the part of the University or college to admit a prospective student whose eligibility is subsequently determined. When the applicant receives notice of the space reservation, he/she should initiate action to have transcripts of all college and high school work sent to the University or college where space has been reserved. The University or college will inform him/her of the number of copies of transcripts required, dates for submittal, and where they should be sent. The applicant should not request that transcripts be sent until advised to do so by the University or college where space has been reserved.

Cal Poly has established procedures to consider qualified applicants who would be faced with an extreme hardship if not admitted. Prospective hardship petitioners should contact the Admissions Office regarding specific policies governing hardship admission.

Redirection

Applicants who cannot be accommodated at their first choice University or college will automatically be redirected to their second choice, and, if they cannot be accommodated there, to their third choice, etc.

Extended Filing Period

Cal Poly majors and categories with unfilled quotas at the end of the initial filing period will continue to accept applications during the extended filing period until quotas are filled. Application priority within the extended period is granted in chronological order in which applications are received.

REQUIREMENTS FOR ADMISSION AS AN UNDERGRADUATE STUDENT

Requirements for admission to California Polytechnic State University are in accordance with Title 5, Part 5, Subchapter 2 of the California Administrative Code. A prospective applicant who is unsure of his status under these requirements is encouraged to consult with a school or college counselor or contact the University admissions office. Students who will be registered for less than a full load (12 units) are subject to the same admission requirements as full time students.

It is not always possible for the University to accommodate all qualified applicants. When there is lack of facilities or qualified faculty to accommodate all prospective students applying for admission to a specified curriculum, those applicants not accommodated will be notified of that fact and will be informed of alternatives open to them at that time.

First-time Freshmen

Applicants who have completed no college work after high school graduation will be considered for admission as first-time freshmen under one of the following provisions. Results of either the CEEB Scholastic Aptitude Test (SAT) or the American College Testing program examination (ACT) are acceptable in establishing eligibility; the latter is preferred by Cal Poly. Registration forms for either test may be obtained from high school or college counselors.

Exceptions: College credit earned concurrent with high school enrollment; college credit earned in summer session after high school and prior to regular matriculation in college; college credit granted for the CLEP or ADVANCED PLACEMENT programs, or military or USAFI courses; or college credit granted for some non-traditional learning experience, will *not* affect the applicant's status as a first-time freshman for application quota purposes as well as admission. Further, the accelerated student, who completes his high school program in mid-year, who has applied to the California State University and Colleges for the following Fall term, but chooses to attend a local community college in the spring term will be considered a first-time freshman for application quota purposes as well as admission. All such college or advanced standing credit, if fully acceptable as transfer credit, will be granted the student after admission.

California High School Graduates and Residents

California high school graduates and legal residents for tuition purposes must have a grade point average and total score on the SAT, or composite score on the ACT, which together provide an eligibility index placing them in the upper one-third of California high school graduates. The grade point average is based upon all high school course work completed in grades 10-12, excluding physical education and military science courses.

ELIGIBILITY INDEX

An eligibility index is used in determining the eligibility of graduates of California high schools (or California legal residents) for freshmen admission to the California State University or Colleges. Grade point averages (G.P.A.) are based on work completed in the last three years of high school, exclusive of physical education and military science. Scores shown are the SAT Total and the ACT Composite. Applicants with a given G.P.A. must present the corresponding test score. Conversely, applicants with a given ACT or SAT score must present the corresponding G.P.A. in order to be eligible.

The minimum eligibility index is: $SAT = 3072$ and $ACT = 741$. The index is computed either by multiplying the grade point average by 800 and adding it to the total SAT score, or multiplying the grade point average by 200 and adding it to 10 times the composite ACT score.

Admissions

<i>Grade Point Average</i>	<i>Minimum ACT Score</i>	<i>Minimum SAT Score</i>
3.21 and above	Eligible with any score	
2.80	19	832
2.40	27	1,152
2.00	35	1,472
1.99 and below		Not eligible

Non-Residents Graduated from High Schools in Other States or Possessions

An applicant who is a non-resident for tuition purposes and who is a graduate of a high school in another state or a U.S. possession must have an eligibility index which would place him among the upper one-sixth of California high school graduates. The minimum required eligibility index is SAT-3402 or ACT-826.

Graduates of High Schools in a Foreign Country

An applicant who is a graduate of a foreign secondary high school must have preparation equivalent to that required of eligible California high school graduates. The University will carefully review the previous record of all such applicants and only those with promise of academic success equivalent to that of eligible California high school graduates will be admitted. Such applicants are not required to take the SAT or ACT test, but are required to submit TOEFL results.

Non-High School Graduates

An applicant who is over 21 years of age, but has not graduated from high school will be considered for admission only when his preparation in all other ways is such that the college believes his promise of academic success is equivalent to that of eligible California high school graduates.

Admission to Two-Year Technical Curricula in Agriculture

Admission to two-year technical curricula in agriculture is available to high school graduates whose preparation and educational objectives are appropriate to the programs offered as determined by appropriate college authorities.

Other Applicants

An applicant not admissible under one of the above provisions should enroll in a community college or other appropriate institution. Only under the most unusual circumstances will such applicants be permitted to enroll in the college. Permission is granted only by special action.

Recommended Preparation

Overall excellence of performance in high school subjects and evidence of academic potential provide the basis for admission to California Polytechnic State University. While no course pattern is required, the applicant to be properly prepared to undertake a full program of studies and to pursue the required program in general education is strongly encouraged to include the following subjects as minimally adequate background for college work:

1. College preparatory English.
2. College preparatory mathematics.
3. College preparatory laboratory science.
4. College preparatory history and/or social science.
5. Study in speech, music, art, foreign language, and other subjects contributing to general academic background.

ADMISSION AS AN UNDERGRADUATE TRANSFER

Any applicant who has attempted college work will be considered for admission under one of the following provisions. Applicants for admission who have not completed 60 semester units (90 quarter units) with a 2.0 (C) grade average should

Admissions

complete and submit the results of either the College Entrance Examination Board Scholastic Aptitude Test (SAT) or the American College Test (ACT). The requirement of 60 semester (90 quarter) units of college work will become 60 semester (90 quarter) units of *transferable* college work applicable to students entering on or after September 1, 1974.

Applicants with 60 or More Semester Units (90 Quarter Units)

Applicants who have completed 60 or more semester units* or the equivalent may be admitted if they meet both of the following conditions. High school transcript and SAT or ACT results are not required.

1. They have attained a grade point average in all college work attempted of 2.0 (C) if they are California residents or 2.4 (five-point scale) if they are not California residents.
2. They were in good standing at the last college attended.

Applicants with Fewer Than 60 Semester Units (90 Quarter Units)

Applicants who have completed fewer than 60 semester units* or the equivalent may be admitted if they meet the above scholarship and good standing requirements and meet the requirements currently in effect for first-time freshmen or, if they have been in full-time continuous enrollment at a college since graduation from high school, they meet the requirements in effect for first-time freshmen at the time of their high school graduation. Requires submission of high school transcript and either SAT or ACT results.

Applicants with Particular Majors

Applicants who do not meet either of the above provisions may be admitted to the university if their desired major is such that 60 semester units of work appropriate to that major are not offered by the institution from which they seek to transfer, and if they meet all of the following:

1. They have completed all appropriate course work offered.
2. They have attained a grade point average of 2.0 (C) in all college work attempted.
3. They were in good standing at the last college attended.
4. They can, in the judgment of the university, succeed in that degree objective.

Other Applicants

Only under the most unusual circumstances will an applicant not meeting either of the above provisions be considered for admission. Permission is granted by special university action.

ADMISSION FROM SCHOOLS AND COLLEGES IN FOREIGN COUNTRIES

The admission of international (foreign) students is governed by separate requirements. The official transcript of record and other credentials of an applicant for admission from a foreign country should be submitted in official English language translation. All application papers should be submitted to the Admissions Office in accordance with the published filing periods. Inquiries concerning admission should be made early enough to allow sufficient time for the necessary correspondence relative to admission. This will aid the applicant in obtaining the necessary travel documents.

An applicant from a foreign country whose education has not been conducted in the English language may be admitted only after demonstrating that his command of the language will permit him to profit from instruction in this college. An applicant must take the Test of English as a Foreign Language (TOEFL).

* Effective Sept. 1, 1974 the requirement is for 60 or more *transferable* units.

REQUIREMENTS FOR ADMISSION AS A GRADUATE STUDENT

All students desiring to do graduate work must file for admission at the Admissions Office. This applies not only to graduates of other colleges and universities, but to Cal Poly graduates, who must also apply for admission as graduate students.

For admission as a graduate student with Unclassified Graduate status, a student shall have completed a four-year course and hold an acceptable baccalaureate degree from an accredited institution generally with a minimum grade point average of 2.5; or shall have completed an equivalent academic preparation as determined by Cal Poly and must meet satisfactorily the professional, personal, scholastic, and other standards for graduate study, including qualifying examinations, as the appropriate College authorities may prescribe. Two copies of each transcript of all undergraduate and graduate studies undertaken must be submitted.

An Unclassified Graduate Student may, upon application, be admitted to an authorized master's degree curriculum in Classified Graduate Status upon completion of the requirements specified for the particular masters' degree program.

See the Graduate Studies issue of Cal Poly *Announcements* for further details.

GRADUATE COURSES TAKEN BY UNDERGRADUATES

Undergraduates who are within 12 quarter units of graduation may petition in advance of completion of the coursework to use up to 9 quarter units of work in 300, 400 or 500 series courses as graduate credit, when such courses are not required in order to receive the baccalaureate. Students should verify the applicability of such credit toward their graduate objective.

REGISTRATION

All students must complete the required residence questionnaire in advance so that their residence status can be determined prior to matriculation.

All students are required to register as majors in a specific department of the University.

The schedule for registration and payment of fees is published in the "Class Schedule and Instructions for Registration" which is sold prior to the start of each quarter. Students should consult this booklet for detailed registration procedures.

Credit for coursework completed is given only when the student is properly registered. A student is not properly registered unless his fees are paid and his completed quarter registration forms are on file in the Registrar's Office. Individuals are not admitted to courses unless they are officially registered.

RESIDENCE

The following statement of the rules regarding residency determination for nonresident tuition purposes is not a complete discussion of the law, but a summary of the principal rules and their exceptions. The statutes governing residence determination for tuition purposes by The California State University and Colleges are found in *Education Code* Sections 22800-23754.4, 23758.2, 23762, and in *Title 5* of the *California Administrative Code*, Article 4 (commencing with Section 41901) of Subchapter 5 of Chapter 1, Part V. As this is written, those regulations are in the process of amendment to implement the uniform residence determination law enacted in Statutes 1972, Chapter 1100 (AB 666), so they are not reproduced here. A copy of the revised regulations is available for inspection upon request being made to the Office of Admissions and Records. The determination of whether a student qualifies as a "resident" for tuition purposes is made by the university or college after review of a residence questionnaire completed by each student upon entering the university or college. The residence questionnaire is designed to provide to the university or college information necessary for residency determination, including the applicability of any exceptions.

The general rule is that a student must have been a California resident for at least one year immediately preceding the residence determination date in order to qualify as a "resident student" for tuition purposes. A residence determination date is set for each academic term and is the date from which residence is determined for that term.

Whether a student has acquired California residence usually depends on whether the student has attained majority; i.e., has become an adult. Majority is attained at 18 years of age. If the student is a minor, residence is derived from (and therefore is the same as) that of the student's father. If the father is not living, the student's residence is that of the mother while she remains unmarried. The residence of a minor cannot be changed by act of the minor or that of the minor's guardian, so long the minor's parents are living.

Upon attaining majority, the student may acquire a residence apart from that of the parents. The acquisition of California residence by an adult requires both physical presence in the state, and at the same time, an intent to remain in California indefinitely, that is, an intent to regard California as one's permanent home. Although physical presence is easily proven, subjective intent is more difficult, requiring the student to present evidence of various objective manifestations of such intent.

A woman may establish her own residence even though she be married.

An alien is not eligible to acquire residence until admitted into the United States for permanent residence under an immigrant visa.

There are several exceptions from nonresident tuition. These rules are limited in scope, and are quite detailed. If it appears that any of them may be applicable, the student may wish to discuss the matter with the residence clerk of the campus. Some of the exceptions provide for:

1. Minors whose parents were residents of California but who have left the state. When the minor reaches age 18, the exception continues for the year to enable the minor to qualify as a resident student.
2. Minors who have been present in California for more than a year before the residence determination date, and entirely self-supporting for that period of time, are treated as adults for purposes of determining residence.
3. Dependent children and spouses of persons in active military service stationed in California on the residence determination date. This exception applies only for the minimum time required for the student to obtain California residence and maintain that residence for a year. The exception is not affected by transfer of the military person directly to a post outside the 50 states and District of Columbia.
4. Military personnel in active service stationed in California on the residence determination date for purposes other than education at state-supported institutions of higher education. This exception applies only for the minimum time required for the student to obtain California residence and maintain that residence for a year.

5. Certain credentialed, full-time employees of community college districts.
6. Full-time State University and Colleges employees and their children and spouses. This exception applies only for the minimum time required for the student to obtain California residence and maintain that residence for a year.
7. Certain exchange students.
8. Children of deceased public law enforcement or fire suppression employees, who were California residents, and who were killed in the course of law enforcement or fire suppression duties.
9. A person in continuous full-time attendance at an institution who had resident classification on the effective date of Statutes 1972, Chapter 1100 (AB 666) shall not lose such classification as a result of adoption of the uniform student residency law on which this catalog statement is based, until the attainment of the degree for which currently enrolled. (*Education Code Section 22862.*) It is anticipated at the time this is written that the new residence law will become effective in early March, 1973.

Students classified incorrectly as residents or incorrectly granted an exception from nonresident tuition are subject to reclassification as nonresidents and payment of nonresident tuition in arrears. Resident students who become nonresidents, and nonresident students qualifying for exceptions whose basis for so qualifying changes, must immediately notify the Office of Admissions and Records. Applications for a change in classification with respect to a previous term are not accepted.

The student is cautioned that this summation of rules regarding residence determination is by no means a complete explanation of their meaning. The student should also note that changes may have been made in the rate of nonresident tuition, in the statutes, and in the regulations between the time this catalog is published and the relevant residence determination date.



FEES AND EXPENSES

Required State Fees for Regularly-Enrolled Resident Students

Application fee (non-refundable)	\$20.00
Identification card fee (each student, per card)	1.00
Facilities fee (non-State funded, per quarter)	2.00
Materials and service fees (per quarter):	
(1-3.9 units)	26.50
(4-7.9 units)	30.00
(8-11.9 units)	33.00
(12 and more units)	39.00

Additional State Fees

Transcript of record	1.00
Late registration fee	5.00
Credit by examination fee (per unit)	1.00
Graduation fee	2.00 to 10.00
Failure to meet administratively required appointment or time limit	2.00
Library fees	See Schedule in library
Check returned for any cause	5.00
Housing (annual license) per quarter:	
Double occupancy	200.00
Single occupancy	270.00

*Parking fees:

Quarterly, non-reserved spaces	10.00
Four-week permits	4.00
One-week permits	1.50
Each alternative vehicle, additional fee	2.00

Conference, short course or institute, per person Estimated cost

Extension course fees (per quarter unit):	
Lecture and discussion	17.25
Activity	22.50
Laboratory	34.50
Summer session fee (per quarter unit)	18.00

†Non-resident tuition—(\$1732 annual maximum):

For 14½ units or more (per quarter)	433.00
For less than 14½ units (per quarter per unit or fraction of unit)	29.00

Auxiliary organization fees (subject to change)

Associated students card fee (required):	
Summer	5.00
Fall	10.00
Winter and spring quarters, each	5.00

University union fee (required):

Summer	6.00
Fall and winter quarters, each	7.00
Spring	6.00

Meals (subject to change):

Annual, 19 meals per week (academic year)	750.00
Quarterly, 19 meals per week	275.00
Quarterly, 15 meals per week	250.00
Quarterly, 12 meals per week	200.00

Health fee (for optional services):

Academic year	27.00
Quarterly	13.00
Sponsored program fee (per week)	10.00

State fees are subject to change upon approval by the Board of Trustees of the California State University and Colleges.

* Proportionate fees apply during summer session. Less than four-wheel, self-propelled vehicles 25 percent of published fee, exclusive of alternate vehicle fee.

† Effective winter quarter, 1974.

ACADEMIC REQUIREMENTS AND POLICIES



Degrees

ACCREDITATION

The University is fully approved as a four-year degree-granting institution by the Western Association of Schools and Colleges (formerly Western College Association). In addition the University holds associate membership in the Northwest Association of Secondary and Higher Schools.

The Chemistry Department is fully approved and accredited by the American Chemical Society and students completing the appropriate curriculum are eligible for certification by the Society. The five-year curriculum leading to the Bachelor of Architecture degree in the School of Architecture and Environmental Design is fully accredited by the National Architectural Accrediting Board.

Seven degree curricula in the School of Engineering and Technology are accredited by the Engineers Council for Professional Development. They are: Aeronautical Engineering, Electrical Engineering, Electronic Engineering, Environmental Engineering, Industrial Engineering, Mechanical Engineering, and Metallurgical Engineering.

Also accredited are Engineering Technology course options in air conditioning and refrigeration technology, electronic technology, manufacturing processes technology, and mechanical technology.

In addition the State Board of Education has accredited the campus to recommend for a number of teaching credentials, described in the catalog section on "Teacher Preparation Programs."

DEGREES OFFERED

<i>Schools and Departments</i>	<i>Curricula with Options/Concentrations</i>	<i>Degrees</i>
School of Agriculture and Natural Resources		
	Agriculture	M.S.
	General Agricultural Sciences	
	International Agriculture	
	Mechanized Agriculture	
	Soil Conservation	
Agricultural Management Department	Agricultural Business Management	B.S.
	Farm Management	B.S.
Agricultural Education Department		
Agricultural Engineering Department	Agricultural Engineering	B.S.
	Mechanized Agriculture	B.S.
Animal Science Department	Animal Science	B.S.
Crop Science Department	Crop Science	B.S.
	Fruit Science	B.S.
Dairy and Poultry Science Department	Dairy Science	B.S.
	Husbandry, Manufacturing	
	Poultry Industry	B.S.
Food Industries Department	Food Industries	B.S.
Natural Resources Management Department	Natural Resources Management	B.S.
Ornamental Horticulture Department	Ornamental Horticulture	B.S.
Soil Science Department	Soil Science	B.S.
Veterinary Science Department		

<i>Schools and Departments</i>	<i>Curricula with Options/Concentrations</i>	Degrees
School of Architecture and Environmental Design		
	Architecture	B.S., M.S.
	Architectural Engineering	B.S.
	City and Regional Planning	B.S.
	Construction Engineering	B.S.
	Landscape Architecture	B.S.
School of Business and Social Sciences		
Business Administration Department	Business Administration Accounting, Economics, Finance and Property Management, Industrial Relations, Management, Management Information Systems, Marketing	B.S., M.B.A.
Economics Department	Economics Business and Industrial Economics International Trade & Development, Quantitative Economics	B.S.
Social Sciences Department	Social Sciences Corrections, Ethnic Studies Social Sciences (teaching), Social Services	B.S.
Political Science Department	Political Science Administration International Affairs Teaching Urban Studies	B.A.
School of Communicative Arts and Humanities		
Art Department		
English Department	English	B.A., M.A.
Foreign Languages Department		
Graphic Communications Department	Graphic Communications Computer Graphic Communications Graphic Design Printing Education Printing Management	B.S.
History Department	History	B.A.
Journalism Department	Journalism Agricultural, Broadcast Media, News-Editorial Public Relations-Advertising, Photojournalism	B.S.
Music Department		
Philosophy Department		
Speech Communication Department	Speech Communication	B.A.

Degrees

<i>Schools and Departments</i>	<i>Curricula with Options/Concentrations</i>	<i>Degrees</i>
School of Engineering and Technology		
	Engineering	M.Engr.
	Engineering Science	B.S.
Aeronautical Engineering Department	Aeronautical Engineering	B.S.
Electronic and Electrical Engineering Department	Electrical Engineering	B.S.
	Electronic Engineering	B.S.
Engineering Technology Department	Engineering Technology	B.S.
	Air Conditioning-Refrigeration, Electronic, Manufacturing Processes, Mechanical, Welding	
Environmental Engineering Department	Environmental Engineering	B.S.
	Air Conditioning-Refrigeration Air Pollution Control Water Pollution/Waste Management	
Industrial Engineering Department	Industrial Engineering	B.S.
	Measurement Science Manufacturing, Systems	
Industrial Technology Department	Industrial Arts	B.A., M.A.
	Automotive Technology, Drafting, Electronics, Graphic Arts, Metals, Wood Plastics Technology	
	Industrial Technology	B.S.
Mechanical Engineering Department	Mechanical Engineering	B.S.
	General, Nuclear Engineering	
Metallurgical Engineering Department	Metallurgical Engineering	B.S.
Transportation Engineering Department	Transportation Engineering	B.S.
School of Human Development and Education		
Child Development Department	Liberal Studies	B.A.
	Child Development	B.S.
	Child and Family Services Nursery School Teaching	
Education Department	Education	M.A.
	Counseling and Guidance, Curriculum and Instruction Physical Sciences, School Supervision, Social Sciences	
Ethnic Studies Department		
Home Economics Department	Dietetics and Food Administration	B.S.
	Home Economics	B.S., M.S.
Men's Physical Education Department	Physical Education	B.S., M.S.
Psychology Department		
Women's Physical Education Department	Physical Education	B.S., M.S.

<i>Schools and Departments</i>	<i>Curricular with Options/Concentrations</i>	<i>Degrees</i>
School of Science and Mathematics		
Biological Sciences Department	Biological Sciences Applied Field Biology, Biology, Botany, Marine Biology, Medical Laboratory Technology, Microbiology, Plant Pathology-Entomology, Zoology	B.S., M.S.
Chemistry Department	Biochemistry Chemistry	B.S. B.S., M.S.
Computer Science and Statistics Department	Computer Science Statistics	B.S., M.S. B.S.
Mathematics Department	Mathematics Applied Mathematics, Computer Sciences, Mathematics Teaching	B.S., M.S., M.A.
Military Science Department		
Physics Department	Physics	B.S.



**ENROLLMENT AT CALIFORNIA POLYTECHNIC STATE UNIVERSITY
SAN LUIS OBISPO, FALL 1972**

Schools and Major Curricula	Under-graduates	Graduates	Men	Women	Total Enrollment
School of Agriculture and Natural Resources					
Agriculture (M.S.).....	0	75	69	6	75
Ag. Bus. Mgmt.....	410	0	336	74	410
Agricultural Engineering.....	57	0	56	1	57
Animal Science.....	594	0	348	246	594
Crop Science.....	131	0	116	15	131
Dairy Science.....	94	0	78	16	94
Farm Management.....	130	0	123	7	130
Food Industries.....	121	0	75	46	121
Fruit Science.....	43	0	40	3	43
Mechanized Ag.....	119	0	118	1	119
Natural Resources Mgmt.....	251	0	230	21	251
Orn. Hort.....	340	0	246	94	340
Poultry Ind.....	47	0	39	8	47
Soil Science.....	121	0	114	7	121
Totals.....	2,458	75	1,988	545	2,533
School of Architecture and Environmental Design					
Architecture.....	1,149	7	1,115	41	1,156
Architectural Engineering.....	84	0	79	5	84
City and Regional Planning.....	112	0	109	3	112
Construction Engineering.....	31	0	31	0	31
Landscape Arch.....	26	0	22	4	26
Totals.....	1,402	7	1,356	53	1,409
School of Business and Social Sciences					
Business Administration.....	811	31	693	149	842
Economics.....	47	0	39	8	47
Political Science.....	109	0	84	25	109
Social Sciences.....	531	0	185	346	531
Totals.....	1,498	31	1,001	528	1,529
School of Communicative Arts and Humanities					
English.....	260	29	64	225	289
Graphic Communications.....	232	0	206	26	232
History.....	208	0	78	130	208
Journalism.....	153	0	70	83	153
Speech.....	53	0	19	34	53
Totals.....	906	29	437	498	935

**ENROLLMENT AT CALIFORNIA POLYTECHNIC STATE UNIVERSITY
SAN LUIS OBISPO, FALL 1972—Continued**

Schools and Major Curricula	Under-grad- uates	Grad- uates	Men	Women	Total Enroll- ment
School of Engineering and Technology					
Aeronautical.....	169	0	164	5	169
Electrical.....	113	0	110	3	113
Electronic.....	550	0	547	3	550
Engineering (M. Engr.).....	0	36	36	0	36
Engineering Science.....	29	0	27	2	29
Engineering Technology.....	417	0	415	2	417
Environmental.....	131	0	120	11	131
Industrial Arts.....	129	6	131	4	135
Industrial Engineering.....	88	0	85	3	88
Industrial Technology.....	221	0	221	0	221
Mechanical.....	329	0	327	2	329
Metallurgical.....	44	0	43	1	44
Transportation.....	112	0	108	4	112
Totals.....	2,332	42	2,334	40	2,374
School of Human Development and Education					
Child Development.....	318	0	10	308	318
Education.....	0	548	244	304	548
Home Economics.....	652	14	5	661	666
Men's Physical Education.....	245	30	275	0	275
Women's Physical Education.....	137	11	0	148	148
Totals.....	1,352	603	534	1,421	1,955
School of Science and Mathematics					
Biochemistry.....	109	0	78	31	109
Biological Sciences.....	466	43	305	204	509
Chemistry.....	82	0	68	14	82
Computer Science.....	276	0	219	57	276
Mathematics.....	331	28	232	127	359
Physics.....	57	0	53	4	57
Statistics.....	9	0	5	4	9
Totals.....	1,330	71	960	441	1,401
Campus Totals.....	11,278	858	8,610	3,526	12,136

ACADEMIC REQUIREMENTS

Curricula leading to graduation with the degree of bachelor of science are offered in agriculture, engineering, applied arts, applied sciences and architecture. Occupational majors in these fields are described under the corresponding sections of this catalog. In addition, Cal Poly offers the following degrees: master of science, master of arts, master of engineering, bachelor of arts, bachelor of vocational education. It also offers the two-year technical certificate in agriculture. Programs leading to teaching credentials authorizing service in the public schools are described under the heading "Teacher Preparation Programs".

APPLICATION FOR GRADUATION

Students shall file application for graduation in the Registrar's Office prior to the last date for filing such applications, as shown in the academic calendar. Application forms and evaluations for graduation are available in the Evaluations Office. The effective date of graduation will be the date when all requirements have been met.

DOUBLE MAJORS

The student will normally meet graduation requirements for a degree in one of the major curricula.

It is permissible for a student to be granted a bachelor's degree with two majors if the complete requirements of both major curricula have been met at the time he files his application for graduation.

A student who desires to submit only one senior project covering two graduation majors must file a petition for special consideration prior to the date of commencing the senior project.

SECOND BACHELOR'S DEGREE

A qualified student who holds a bachelor's degree from Cal Poly or from another accredited institution may be awarded a second bachelor's degree in a different major when all requirements have been met and providing a minimum of 36 units of course work have been completed in residence after the requirements for the first degree have been fulfilled. A joint senior project is precluded.

BACHELOR'S DEGREES

GENERAL REQUIREMENTS FOR GRADUATION

All candidates for the bachelor of science degree, the bachelor of arts degree, or the bachelor of architecture degree shall have completed the requirements in one of the listed curricula with a minimum "C" grade average for all units in the major, and shall have earned a total number of grade points at least equal to twice the number of units attempted. Transfer students, in their work taken at this college, must earn a number of grade points at least equal to twice the number of units attempted at this college. All candidates for these degrees shall have earned not less than 50 quarter units in residence, and shall have earned at least 30 of these units among the last 40 units counted toward the degree. (Extension credit or credit by examination may not be used to fulfill the residence requirement.)

Candidates for the bachelor of science degree must present from 186 to 210 units for graduation according to the approved curriculum for each major. Candidates for the bachelor of arts degree must present 186 units for graduation according to the approved curriculum for each major.

GENERAL EDUCATION BREADTH REQUIREMENT

All candidates for the bachelor's degree must complete a minimum of 63 quarter units of general education as specified below. The curriculum for each major published in this catalog is designed to satisfy the general education breadth requirement. The requirement is met in different ways depending on the particular major. The student planning to transfer from another college should therefore consult the published curriculum for his major and plan his course work accordingly.

No course shall be used for this purpose if it has a prerequisite unless such prerequisite is also counted as general education. Only degree credit courses in the 100, 200, and 300 series may be counted as general education. No more than six units in the major academic discipline of the student may be counted as fulfilling the general education requirement.

Natural Sciences

At least 15 units chosen from courses in the natural sciences, with at least one course in life science (Bact, Bio, Bot, Cons, Ent, Zoo), and at least one course in physical science (Astr, Chem, Geol, PSc, Phys). Up to six units of "broadly-based" course work in the Schools of Agriculture and Natural Resources, Architecture and Environmental Design, or Engineering and Technology may be counted in this category, provided that these units are taken outside the School in which the student is enrolled. No more than three courses having the same prefix may be counted to satisfy the natural science requirement. Maximum 24 units.

Social Sciences

At least 9 units chosen from courses in Ant, Ec., Geog, Pol Sc, Psy, Soc Sc, Soc. All students must take Pol Sc 201.¹ No more than two courses having the same prefix may be counted in this category. Maximum 16 units.

Humanities

At least 15 units chosen from courses in Art, Dr, Hum, literature (in English or in a foreign language), Mu, Phil. All students must include two courses in literature and/or philosophy. All students must take Hist 204 and 205,¹ or equivalent. No more than 3 units each in Art, Dr, Mu, nor 6 units in Hist, may be counted in this category. Maximum 21 units.

Basic Subjects

Mathematical sciences (CSc, Math, Stat) (at least a 3-unit course), written communication (Engl) (one course), oral (Sp) or written communication (at least one course). Minimum 12 units, maximum 16 units.

Other Subjects

Physical Education Activity or Health Education (3 to 5 units, at the option of individual Schools).² Any 6 to 4 units (depending upon P. E. requirements of individual Schools), provided that these additional units are taken outside the department in which the student is enrolled. Minimum 3 units, maximum 9 units.

¹ These courses are required to satisfy Section 40404 of the Administrative Code, but the units may also be counted as general education (Section 40405). Transfer students, certified as having completed the general education requirement, will have to complete this requirement separately if they have not already done so. (Social sciences and history majors will take an equivalent sequence.)

² Exemption from the course in Health Education may be granted by the Director of Admissions, Evaluations, and Records upon receipt of a statement of contrary religious belief. Exemption from required Physical Education Activity may be authorized by the Director of Admissions, Evaluations, and Records based on recommendation of medical authority, or attainment of age 18 at the time of initial enrollment. Any veteran may claim appropriate military service as a substitute for the physical education requirements.

MASTER'S DEGREES

Cal Poly offers graduate programs leading to the master's degree in several areas. Curricula for the master's degrees are briefly outlined in the appropriate departmental sections of this catalog. For complete requirements for graduate study and for the master's degrees consult the *Graduate Study Bulletin*.

TEACHER PREPARATION PROGRAMS

California Polytechnic State University is accredited by the State Board of Education to recommend for the following teaching credentials:

- Standard Teaching Credential with Specialization in Elementary Teaching
- Standard Teaching Credential with Specialization in Secondary Teaching

Recommended majors are:

Agricultural Science, Biological Sciences, Chemistry, Child Development, English, Graphic Communications, History, Home Economics, Industrial Arts, Journalism, Mathematics, Physical Education (for men and women), Physical Sciences, Physics, Political Science, Social Sciences, and Speech.

Recommended minors are:

Agricultural Science, Art, Biological Sciences, Chemistry, Child Development, Computer Science, Drama, Economics, English, Ethnic Studies, History, Home Economics, Industrial Arts, Journalism, Mathematics, Music, Physical Education, Physical Sciences, Physics, Political Science, Social Sciences, and Speech.

In addition Cal Poly is accredited to recommend for the Standard Designated Services Credential, Specialization in Counseling, and the Standard Supervision Credential (Supervision and Principalship).

For teaching credential requirements and procedures for entering the teacher education program consult the Education Department. A bulletin, Standard Teaching Credential Requirements, is available upon request.

TWO-YEAR TECHNICAL CURRICULA

All candidates for a technical certificate shall have completed 98 quarter units of courses approved by the department granting the certificate, shall have been in residence at least two quarters immediately preceding graduation, shall have earned not less than 32 quarter units in residence, and shall have earned a total number of grade points at least equal to twice the number of units attempted.



ACADEMIC POLICIES

Academic Obligations

Each student is expected to be diligent in the pursuit of his course of study in order that both he and the State will receive maximum benefit from the educational opportunities provided.

Students are expected to satisfy the academic demands required by their instructors in such ways as they may set forth, in order to satisfy the instructor that they are performing their assignments in a proper manner.

An instructor, with the President's approval, may at any time exclude from his course any student guilty of unbecoming or disorderly conduct toward the instructor or the class. The instructor may refer the case of misconduct to the Dean of Students for disciplinary action.

Class Attendance

Students are expected to be regular in attendance to keep the quality and quantity of work high. Absence from classes is regarded as serious, and no excuses for work missed are provided.

An excused absence can be allowed only by the instructor in charge of the class upon consideration of the evidence justifying the absence presented by the student. An excused absence merely gives the individual who missed the class an opportunity to make up the work and in no way excuses him from the work required.

Maximum and Minimum Loads

The maximum load for regular students is 20 quarter units of work including audited courses and concurrent work at other colleges; the only exceptions are made with the advance approval of the student's major department head and completion of a petition to carry excess load which is available at the Registrar's Office. Regular credit will not be given for a course completed in any quarter unless the course appears on the student's approved program card for that quarter. Maximum load requirements may be waived only on presentation of evidence of ability to carry successfully such a group of courses. Maximum load for graduate students is 16 units per quarter.

Minimum Scholarship Requirements

Uniform minimum standards for academic probation or disqualification are in effect at all California State University and College campuses. Both academic progress toward degree objective and quality of academic performance are considered in the determination of a student's eligibility to remain enrolled. A student becomes subject to academic probation or disqualification under either of the following conditions:

I. Academic progress:

- A. A student shall be subject to academic progress probation if, in any quarter, he fails to earn twice as many progress points as all units attempted during that quarter.
- B. A student shall be removed from academic progress probation and restored to good academic progress standing when, in any quarter, he earns twice as many progress points as all units attempted in that quarter.
- C. A student shall be subject to academic progress disqualification if during his second consecutive quarter of probation he has failed to earn twice as many progress points as all units attempted during that quarter.

II. Academic performance:

- A. A student shall be subject to academic performance probation if his overall grade point average or his Cal Poly cumulative grade point average falls below 2.0 (C).
- B. A student shall be removed from academic performance probation and restored to good academic performance standing when he earns a cumulative grade point average of 2.0 (C) for all academic work attempted and for all such work attempted at this college.

Academic Policies

C. A student on academic performance probation *may* be disqualified when his cumulative grade point average for all academic work attempted or for all such work attempted at this college is 7 or more grade points below 2.0 (C). Such a student shall be subject to disqualification when his academic record, as indicated in the sentence above, falls below the following standards:

- (1) If a freshman or sophomore student (less than 90 quarter units of college credits completed) is 22½ or more grade points below a 2.0 (C) average.
- (2) If a junior student (90 to 134 quarter units of college credits completed) is 13½ or more grade points below a 2.0 (C) average.
- (3) If a senior student (135 or more quarter units of college credits completed) is 9 or more grade points below a 2.0 (C) average.

A student subject to disqualification will be notified by the dean of the school in which the student is enrolled as a major as soon as possible following the end of the quarter in which his performance fails to meet conditions prescribed in I (C) or II (C) above; in any case, disqualification is to be effected no later than the close of the next quarter.

A student who is disqualified for inadequate progress or performance will not be readmitted until presentation of satisfactory evidence that he has improved his chances of academic success. The request for readmission will be referred to the dean of the school in which the student wishes to enroll.

ACADEMIC PROBATION

Students with a cumulative grade point average of less than 2.0 may not participate on intercollegiate teams nor may they hold positions of leadership in student organizations or student government groups. This includes, but is not limited to, such groups as: athletic teams, debate teams, drama casts, judging teams, drill teams, Model U.N. delegation, rifle team, ASI councils, boards and committees. Such students may not hold an office in a student organization, nor may they be editors, managers, or hold similar positions on student publications. Students on academic probation may participate in such activities as club membership, intramurals, and music, that do not include travel and the official representation of the University.

The 2.0 cumulative grade point average is meant to be a minimum standard and certain groups may have set higher standards for specific positions or areas of responsibility that require considerable commitments of time and energy.

ELIGIBILITY FOR INTERCOLLEGIATE ATHLETICS

Eligibility for competition in intercollegiate athletics is regulated in general by the rules of the National Collegiate Athletic Association (NCAA) and specifically by current Conference and University regulations. The Director of Athletics is responsible for maintaining up-to-date intercollegiate athletics eligibility rules applicable to the University. The Faculty Athletic Representative has the responsibility for the interpretation of the NCAA, Conference, and University rules for determining student eligibility to represent the University in intercollegiate athletic events.

Grading System

The following marking and grading system is in effect:

		<i>Grade</i>	
		<i>Points Earned</i>	<i>Progress Points</i>
		<i>Per Unit</i>	<i>Earned per Unit</i>
A	Superior Attainment of Course Objectives	4	4
B	Good Attainment of Course Objectives	3	3
C	Acceptable Attainment of Course Objectives ...	2	2
D	Poor Attainment of Course Objectives	1	1
F	Non-Attainment of Course Objectives	0	0
CR	Credit	—	2
NC	No Credit	—	0
AU	Audit	—	—
I	Incomplete	—	—
SP	Satisfactory Progress	—	—
W	Withdrew	—	—

Grades of CR, NC, AU, I, SP, and W are not assigned grade points or included in the computation of grade point average (total grade points earned divided by total units in which the student received a grade of A, B, C, D, or F). The grades of A, B, C, D, F, CR, NC, but excluding AU, I, SP, and W are used in determination of satisfaction of the progress points requirement (twice as many progress points earned as total registered units during the quarter). Courses for which the mark of AU, I, SP, or W are recorded are not included in the registered unit total for purposes of the progress point calculation.

A final grade is that mark assigned to each student by the instructor signifying the conclusion of the course offering. The following marks constitute final grades: A, B, C, D, F, CR, NC.

Audit

Enrollment as an auditor is subject to the permission of the instructor; provided that enrollment in any course as an auditor shall be permitted only after students otherwise eligible to enroll in the course on a credit basis have had an opportunity to do so. Auditors are subject to the same fee structure as credit students and regular class attendance is expected. Once enrolled as an auditor, a student may not change to credit status unless such a change is requested prior to the last day to add classes. A student may change from credit to audit no later than the last day to drop a course without penalty.

Procedures for auditing courses are published in the quarterly *Class Schedule*.

Incomplete

An incomplete signifies that a portion of required course work has not been completed and evaluated in the prescribed time period due to unforeseen, but fully justified, reasons and that there is still a possibility of earning credit. It is the responsibility of the student to bring pertinent information to the instructor and to reach agreement on the means by which the remaining course requirements will be satisfied. A final grade is assigned when the work agreed upon has been completed and evaluated.

An "incomplete" must be made up within one calendar year immediately following the end of the term on which it was assigned. This limitation prevails whether or not the student maintains continuous enrollment. Failure to complete the assigned work will result in an 'incomplete' being counted as equivalent to an 'F' (or an 'NC') for grade point average.

Satisfactory Progress

The "SP" symbol is used in connection with courses that extend beyond one academic term. The symbol indicates that work in progress has been evaluated as satisfactory to date but that the assignment of a precise grade must await the completion of additional course work. Cumulative enrollment in units attempted may not exceed the total number applicable to the student's educational objective. All work is to be completed within one calendar year of the date of first enrollment and a final grade will be assigned to all segments of the course on the basis of overall quality. Any extension of this time period must receive prior authorization by the Dean of the School in which the student is a degree candidate.

Academic Policies

Credit-No Credit Grading

The course description will indicate those courses offered only on a Credit-No Credit grading basis. Exclusive of courses offered only on a Credit-No Credit grading basis, students may elect to take additional courses on a Credit-No Credit grading basis within the following limits:

1. Up to 2 courses (not to exceed 8 units) per student per quarter may be elected on a Credit-No Credit grading basis, and further, a maximum of 15 courses (not to exceed 45 units) per student may be elected on a Credit-No Credit grading basis.
2. Courses designated as "M" courses in the student's major may not be elected on a Credit-No Credit grading basis.
3. A student must have not less than a 2.0 (C) grade point average in his cumulative Cal Poly course work to be eligible to elect a course on a Credit-No Credit grading basis.
4. No courses taken on a Credit-No Credit grading basis may be used to satisfy graduate program requirements.
5. Nonmatriculated students in the Extension Program, Summer Session and Workshops must meet the same requirements as matriculated students to elect courses on a Credit-No Credit grading basis. (The 2.0 GPA requirement is waived in the case of nonmatriculated students having no previous course work recorded at Cal Poly.)

Students desiring to elect a course on a Credit-No Credit grading basis must be currently enrolled in the course and must complete the appropriate form available from the Records Office. Such declaration for Credit-No Credit grading must be filed not later than the end of the 7th week of instruction of the quarter. Students may not change from one grading system to the other after the end of the normal no-penalty withdrawal date of the quarter.

A final grade of CR (Credit) will be recorded for academic performance equivalent to a grade of "C" or above; a final grade of NC (No Credit) will be recorded for academic performance equivalent to a grade of "D" or "F."

Repeating a Course

A student who has received a grade of "D" or "F" in a course taken at this University may repeat the course here and have the new grade recorded along with the prior grade. The grade earned by repeating the course will be awarded the appropriate progress points, grade points, and units attempted and completed. Effective with the 1973-74 college year, for up to 20 units of repeated "D" or "F", the original grade points and units will not be counted in the calculation of the grade point average. A student desiring to repeat a course under the terms of this section must file a notice of intent to repeat a course in the Records Office prior to the end of the seventh week of instruction during the quarter in which he repeats the course.

Courses in which the student received an "F" may not be repeated for Credit-No Credit. Except where noted in the specific course description, a student may not enroll in (except as an auditor) or receive credit by examination for any course in which he has received a grade of "C" or higher, including "CR."

Withdrawals

This symbol indicates that the student was permitted to drop the course after the 15th day of instruction with the approval of the instructor and appropriate campus officials. It carries no connotation of quality of student performance and is not used in calculating grade point average or progress points.

Students may withdraw from a course with no academic penalty during the initial 15 instructional days of the quarter, by notification to the instructor. Beyond the 15th instructional day of the quarter and through the end of the 7th week of instruction, students may withdraw from a course and be assigned a W if passing at time of withdrawal, or an F if failing at time of withdrawal, by processing a petition to withdraw which is available from the Records Office. Except for University recognized emergencies, no withdrawals from courses are permitted beyond the 7th week of instruction.

PROGRAM CHANGES

The student is held responsible for every course appearing on his official program card. Each change must be made on or before the applicable last date as published in the academic calendar and must be filed with the Registrar's Office on the proper form. During the first weeks of each quarter students make program changes by presenting their Change of Program cards to instructors. Changes are not made on forms issued at the Registrar's Office during this period.

Changes which must be made on or before the last day to add courses include adding a class, increasing units in a course, changing from audit to credit. Changes which must be made on or before the last day for dropping classes without penalty include dropping a class (no penalty), reducing units in a course, changing a section of a course, changing from credit to audit. After the 7th calendar day, forms for the change of program may be obtained from the Registrar's Office.

The last day to drop classes without penalty during the regular quarters is the 15th instructional day of the term. After this day a student may withdraw from a course in which he is enrolled for credit only by accepting a grade based upon his standing in the course at the time of withdrawal. After this day, forms for withdrawing from class may be obtained from the Registrar's Office. The instructor will indicate on the form whether the student is to receive a grade of W or F for the course. The grade of W indicates that the student is passing (Grade A to D) in the course at the time of withdrawal. Except for college-recognized emergencies, no withdrawals from a course will be permitted after the end of the seventh week of instruction.

A special provision, applicable only to students in their first quarter at the College, permits the substitution, without prejudice, of a prerequisite course in a sequence of courses for a later course in the sequence through the end of the fourth week. Only the substituted course appears on the transcript and the grade is based on performance after the change.

Students who withdraw from University prior to the end of the quarter will receive a W or F grade in each course depending upon whether passing or failing work has been accomplished up to the time of withdrawal.

Course Numbering System

The numbering system used is a three-digit system. Courses are generally numbered according to the plan shown below.

- | | |
|---|--|
| 10- 99 Courses offered for foreign students under contract with the U.S. Agency for International Development or non-degree credit short courses. | 400-499 Courses for advanced undergraduates and graduate students. |
| 100-299 Courses taught primarily in the freshman and sophomore years. | 500-599 Graduate courses. |
| 300-399 Courses primarily for advanced undergraduate students, generally bearing no graduate degree credit. | 600-699 Courses for professional advancement within a special field and do not carry credit for degree requirements in any of the curricula. |

RECORDS PROCEDURES

Changes in Curriculum

Students who find that they are preparing for a profession which does not provide the type of education for which they have the greatest aptitude should contact their adviser and the college Counseling Center for advice and assistance in making curriculum changes. Students will be permitted to change their major curriculum after a minimum of two quarters in residence during which they follow the prescribed curriculum for their current major as far as possible. Admission to a new curriculum will depend on the availability of space within the limitations imposed by budget, faculty, and facilities.

Transfer from one curriculum to another does not in any way change a student's scholastic standing.

Transfer from a technical to a degree curriculum may be permitted subject to scholarship requirements and completion of the specified number of units in residence.

Upon transfer from a degree to a technical curriculum, at the campus, a student's record is evaluated in terms of the technical curriculum. Courses completed prior to transfer which are applicable to the required courses in the technical curriculum will be transferred intact. The remaining courses completed prior to transfer must apply as electives up to, but not in excess of, the number of elective units specified in the technical curriculum. In the case of an excess of elective units, the student may choose which units shall apply. For purposes of computing the grade point average for graduation, only those courses transferred as outlined above and those taken subsequent to transfer will be used.

Revision of Curricular Requirements

A student remaining on continuous attendance in regular sessions and continuing in the same curriculum in any state university or college, in any of the California community colleges or in any combination of California community colleges and state university and colleges, may, for purposes of meeting graduation requirements, elect to meet the graduation requirements in effect either at the time of his entering the curriculum or at the time of his graduation therefrom, except that substitutions for discontinued courses may be authorized or required by the dean of his school.

Curriculum Deviation

Although a curriculum is specified for each major, under certain conditions a student may be permitted some deviation from the established curriculum. Detailed instructions for applying for a curriculum deviation may be obtained from the Registrar's Office.

Holding of Records

Student records may be placed in a "Hold" status because of financial or other obligations to the college. While the student's records are so held, he will not be issued a "permit to register" nor will transcripts of his credits be released to anyone. The student's records will be held until the obligation is cleared to the satisfaction of the office or department placing the "Hold."

Transfer to Other Colleges

Students who plan to transfer from the California Polytechnic State University to another college or university should, at the earliest possible date, request that their transcript of record be forwarded by the Registrar's Office. Any evaluation of transcripts presented to another college or university will be made by the new institution in terms of its established policies.

Honorable Dismissal

Honorable dismissal is noted on the transcript of each student who graduates or withdraws from the college, unless he has been disqualified because of misconduct.

CREDIT POLICY

Advanced Placement

The University offers credit and advanced placement for those students who achieve scores of 3, 4, or 5, on the College Entrance Board advanced placement examinations. Nine quarter units of lower division credit will be granted for such achievement in each subject examination taken upon request and submission of the examination results to the Director, Admissions, Records and Evaluations.

Credit by Examination

A student enrolled either as a regular or limited student may be permitted, at the discretion of his school dean, to obtain credit by examination for courses in subject matter fields in which he is especially qualified through previous education or experience and for which credit has not otherwise been given. A fee of \$1 per unit is charged for such an examination. It may include written, oral, or skills tests, or a combination of all three types, and will be sufficiently comprehensive to determine that the student has essentially the same knowledge and skills as those students who successfully complete the course. The grade received is entered on the student's permanent record. The length of the examination will be consistent with the unit value of the course.

Credit toward partial completion of the general education-breadth requirements will be granted for the completion of specified tests of the general examinations in the College Level Examination Program with an appropriate score, and up to 4 units of elective or course equivalent credit for each subject examination completed with an appropriate score. The maximum number of units of credit the University will grant for the successful completion of any combination of general and subject examinations of the College Level Examination Program will be 45 quarter units.

A credit by examination request will not be considered for a course for which a student has received a failing grade at Cal Poly or for which a student has previously unsuccessfully attempted credit by examination. Arrangements to obtain course credit by examination may be made with the head of the department in which the course is taught.

Units of credit received through this procedure may not apply toward the residence requirements for any of the degrees or credentials offered by the college.

Detailed instructions for applying for credit by examination may be obtained from the Registrar's Office.

Honors

Credit for Military Service

Nine quarter units of elective credit will be allowed toward graduation to any student with honorable discharge submitting evidence of satisfactory completion of one year of training in the military service of the United States.

In addition to the nine quarter units, $13\frac{1}{2}$ quarter units of elective credit will be allowed toward graduation to any student submitting evidence that he has received a commission in the Army, Navy, Air Force, Coast Guard, or Marine Corps. Maximum total credit possible toward graduation for military service is $22\frac{1}{2}$ quarter units. Credit is not given for completion of the six-month Reserve Training Programs or for college level General Educational Development Tests.

No grade points are assigned in connection with units of credit allowed for military service. The units allowed are not included in scholarship computations. In allowing for credit for inservice training, California Polytechnic State University follows the recommendations of the American Council on Education in terms of units allowed and subject matter covered.

Auditing of Courses

An auditor is a student who is attending courses for no credit. The student must be registered with fees paid for the quarter in which the course is to be audited. A student may enroll to audit a course during the first week of instruction and no later than the last day to add a course. The deadline to change from audit to credit is the same as the last day to add a course. A student may change from credit to audit no later than the last day to drop a course without penalty.

In cases where class sections must be limited in enrollment, preference will be given to students enrolling for credit. Students may not enroll for audit classes at registration.

The materials and service fee and non-resident tuition fee are determined on the basis of the total units for which the student is enrolled including courses audited.

HONORS

Candidates for bachelor's degrees are eligible for "Graduation with Honors" if at the end of winter quarter preceding commencement they have earned a 3.1 or better cumulative grade point average, including all college level work attempted at Cal Poly and all college level work accepted from other institutions.

The "President's Honors List" is compiled at the end of each college year to honor those undergraduate students who have demonstrated consistent achievement, as represented by being named to the "Dean's Honors List" for any three of the four quarters of the college year.

The "Dean's Honors List" is compiled at the end of each quarter to honor undergraduate students who have completed 12 or more units during the quarter with a grade point average which places them in the top 15 percent of the students in their school.

Entering freshmen who rank in the top five percent of high school graduates are granted "Honors at Entrance."

STUDENT CONDUCT

It is expected that all California Polytechnic State University students are enrolled for serious educational pursuits and that they will conduct themselves so as to preserve an appropriate atmosphere of learning. It is also expected that all students who enroll at Cal Poly are willing to assume the responsibilities of citizenship in the campus community. Association in such a community is voluntary, and any student may withdraw from it at any time that he considers the obligations of membership disproportionate to the benefits. While enrolled, students are subject to campus authority which includes the prerogative of dismissing those whose conduct is inimical to the aims of an institution of higher education.

While enrolled, students are subject to the regulations governing discipline stated in Education Code Section 22505 and in Title 5 of the California Administrative Code, Sections 41300, 41301, and 41302, and to such rules and regulations as have been approved and promulgated by authority of the President. Copies of 5 Cal Adm Code 41301 and 41302, which deal specifically with student disciplinary regulations, are distributed to all new students during each registration period and are posted officially in the Administration Building. Other applicable regulations are contained in this Catalog, in the Campus Administrative Manual, and in other official College publications.

Student Disciplinary Procedures

The Chancellor of the California State University and Colleges has established procedures for student disciplinary matters which are included in the Campus Administrative Manual, the official campus publication of policies and procedures which is available in the library for easy reference.

Educating students to their responsibilities as good citizens of the University and of the community is a campus-wide responsibility requiring the cooperation and understanding of the entire campus. Title 5 of the California Administrative Code assigns to the President responsibility for enforcement of student disciplinary regulations. The President has delegated to the Coordinator of Student Discipline the responsibility and commensurate authority to administer student disciplinary regulations but has retained decision-making authority on final appeals at the local campus level.

When the conduct or behavior of a student is such that he is alleged to be in violation of applicable provisions of the Education Code, regulations of the Board of Trustees, and campus rules and orders issued thereunder, the case is referred to the Disciplinary Coordinator for investigation of the facts leading to the allegation. If the investigation reveals that there is reason to believe that an infraction has been committed by a student, disciplinary procedures as described in the Manual will be initiated.

Eligibility for Student Activities

Students on either academic or disciplinary probation may not participate on intercollegiate teams nor may they hold positions of leadership in chartered student organizations or coded student government groups. Students on probation may participate in such student organizations and groups as members but they may not hold an office or represent the University or the Associated Students, Incorporated, in any official capacity.

Student Involvement in Disciplinary Procedures

Student Government includes a judicial branch, the Student Judiciary, which rules on the constitutionality of student actions within the bylaws of the Associated Students. Student Hearing Boards conduct hearings in the residence halls with recommendations to the Disciplinary Coordinator or his designee.

In addition, students may be represented on disciplinary review committees which also include members of the faculty and the administrative staff and which make recommendations to the President.

Student Conduct

Procedural Due Process

In all matters of student discipline, each person charged with a violation is given every courtesy, privilege, and right under the law and within the context of the uniqueness of a public institution of higher learning.

Causes for Disciplinary Action

Causes for disciplinary action are cited in Section 41301 of Title 5 of the California Administrative Code:

Expulsion, Suspension and Probation of Students

Following procedures consonant with due process established for the campus of which he is a student, any student of a campus may be expelled, suspended, placed on probation or given a lesser sanction for one or more of the following causes which must be campus related:

- (a) Cheating or plagiarism in connection with an academic program at a campus.
- (b) Forgery, alteration or misuse of campus documents, records, or identification or knowingly furnishing false information to a campus.
- (c) Misrepresentation of oneself or of an organization to be an agent of a campus.
- (d) Obstruction or disruption, on or off campus property, of the campus educational process, administrative process, or other campus function.
- (e) Physical abuse on or off campus property of the person or property of any member of the campus community or of members of his family or the threat of such physical abuse.
- (f) Theft of, or non-accidental damage to, campus property, or property in the possession of, or owned by, a member of the campus community.
- (g) Unauthorized entry into, unauthorized use of, or misuse of campus property.
- (h) On campus property, the sale or knowing possession of dangerous drugs, restricted dangerous drugs, or narcotics as those terms are used in California statutes, except when lawfully prescribed pursuant to medical or dental care, or when lawfully permitted for the purpose of research, instruction or analysis.
- (i) Knowing possession or use of explosives, dangerous chemicals or deadly weapons on campus property or at a college campus function without prior authorization of the campus president.
- (j) Engaging in lewd, indecent, or obscene behavior on campus property or at a campus function.
- (k) Abusive behavior directed toward, or hazing of, a member of the campus community.
- (l) Violation of any order of a campus president, notice of which had been given prior to such violation and during the academic term in which the violation occurs, either by publication in the campus newspaper, or by posting on an official bulletin board designated for this purpose, and which order is not inconsistent with any of the other provisions of this Section.
- (m) Soliciting or assisting another to do any act which would subject a student to expulsion, suspension or probation pursuant to this Section.
- (n) For purposes of this Article, the following terms are defined:
 - (1) The term "member of the campus community" is defined as meaning California State University and Colleges Trustees, academic, non-academic and administrative personnel, students, and other persons while such other persons are on campus property or at a campus function.
 - (2) The term "campus property" includes:
 - (A) real or personal property in the possession of, or under the control of, the Board of Trustees of the California State University and Colleges, and
 - (B) all campus feeding, retail, or residence facilities whether operated by a campus or by a campus auxiliary organization.

(3) The term 'deadly weapons' includes any instrument or weapon of the kind commonly known as a blackjack, slung shot, billy, sandclub, sandbag, metal knuckles, any dirk, dagger, switchblade knife, pistol, revolver, or any other firearm, any knife having a blade longer than five inches, any razor with an unguarded blade, and any metal pipe or bar used or intended to be used as a club.

(4) The term 'behavior' includes conduct and expression.

(5) The term 'hazing' means any method of initiation into a student organization or any pastime or amusement engaged in with regard to such an organization which causes, or is likely to cause, bodily danger or physical harm to any member of the campus community; but the term 'hazing' does not include customary athletic events or other similar contests or competitions.

(o) This Section is not adopted pursuant to Education Code Section 23604.1.

(p) The provisions of this Section as hereinabove set forth shall only apply to acts and omissions occurring subsequent to its effective date. Notwithstanding any amendment or repeal pursuant to the resolution by which any provision of this Article is amended, all acts and omissions occurring prior to that effective date shall be subject to the provisions of this Article as in effect immediately prior to such effective date.

Among the specific causes for which the University will take such disciplinary action are: the bringing or drinking of alcoholic beverages on campus; being intoxicated on campus; being convicted by a public law enforcement agency of a misdemeanor involving moral turpitude, or of a felony, resulting from behavior which indicates that the student's presence on campus would constitute a threat to the safety or welfare of the campus community; repeated violations of campus rules and regulations, including those pertaining to driving and parking of vehicles.

In accordance with provisions of Section 41301 above, the President has issued and posted officially an order which prohibits the consumption, possession, or use of alcoholic beverages on campus. Students who violate this order are subject to the penalties provided for in Sections 41301 and 41302, Title 5 of the California Administrative Code.

Disciplinary action varies with the severity of the violation. If the unacceptable behavior involves use of motor vehicles, the student may be restricted from driving or parking on campus. If the unacceptable behavior involves matters pertaining to on-campus housing or dining, the student may be restricted from living or dining on campus.

Debts Owed to the University

From time to time the student may become indebted to the university. This could occur, for example, when the student fails to repay money borrowed from the campus. Similarly, debts occur when the student fails to pay dormitory or library fees, or when the student fails to pay for other services provided by the college at the request of the student. Should this occur, Sections 42380 and 42381 of *Title 5 of the California Administrative Code* authorize the university to withhold "permission to register, to use facilities for which a fee is authorized to be charged, to receive services, materials, food or merchandise or any combination of the above from any persons owing a debt" until the debt is paid. Under these provisions the university may withhold grades and transcripts. If a student feels that he or she does not owe all or part of a particular fee or charge, the student should contact the university business office. The Director of Business Affairs or the Dean of Students upon referral of the business office, will review the pertinent information, including information the student may wish to present, and will advise the student with respect to the debt.



STUDENT ACTIVITIES AND SERVICES



STUDENT ACTIVITIES

The campus provides an integrated program of classroom and laboratory instruction, gainful employment, and co-curricular activities. The latter are under the direction of the Director, Activities, who is responsible for initiating and coordinating a well-rounded program of activities designed to develop leadership qualities in all students.

STUDENT GOVERNMENT

All students are members of the student association known as the Associated Students of California Polytechnic State University, San Luis Obispo, Inc. The government of student affairs is vested in the Student Affairs Council, the members of which are selected according to regulations established in the student body bylaws. In addition, there are boards established to oversee publications, athletics, music, University Union program, and Poly Royal. All interested students have an opportunity to participate in student government.

ATHLETICS

Intercollegiate competition is held under the rules and auspices of the National Collegiate Athletic Association. Conference competition is maintained in most sports as a member of the California Collegiate Athletic Association. A full program of intercollegiate competition is offered in football, basketball, baseball, track, wrestling, gymnastics, swimming, water polo, golf, and cross country, all of which are major sports. Awards are given to letter winners. Freshman competition is offered in sports where competition is available and sufficient interest warrants it.

The Physical Education Department offers physical activities designed to provide a sound program of recreation, education in physical skills, and the give-and-take of games. Varsity teams in the intercollegiate sports offer opportunity for the more skilled. Intramural teams provide year-round competition in a dozen sports at an easier level of play to all who wish to enter. Trophies are awarded winners in touch football, track, horseshoes, basketball, volleyball, swimming, wrestling, badminton, softball, tennis and golf. For eligibility rules see **ELIGIBILITY FOR INTERCOLLEGIATE ATHLETICS**.

CAMPUS ORGANIZATIONS

Clubs and organizations cover all departments and activities, and the opportunity exists for every student to take an active part in club life. There are departmental and professional organizations, hobby-interest clubs and many others serving the areas of honor societies, service clubs, residence groups, ethnic groups, and religious faith groups.

UNIVERSITY UNION PROGRAM

Most of the social programming on the campus is done by the University Union Program Board and its 11 committees. The board is affiliated with the Association of College Unions and it functions within policies and budgets of the Student Affairs Council. Committee membership is open to all interested students. The committees cover assemblies, dance, drama, films, fine arts, games and hobbies, outings, personnel, public relations, social, and special events.

MEDIA

Publications of the student body at California Polytechnic State University, San Luis Obispo, are not only written and edited by students, but are also printed in the campus printing department as laboratory work for students majoring in printing. Editorial and photographic work for publications is handled primarily by students of the journalism classes. *Mustang Daily* is the official newspaper of the associated students. *Alternative* is the campus literary magazine. Miscellaneous publications include the *California Future Farmer* magazine, a monthly magazine supported by and mailed to 19,000 Future Farmers of America members in nearly 200 California high schools; and the *Mustang Handbook*. In addition, the Journalism Department operates KCPR-FM, a student station heard on campus and in the surrounding community.

POLY ROYAL

Each year during the spring Cal Poly holds an open house exhibition and show conducted primarily by the Associated Students. This event is known as Poly Royal. Its purpose is to display work accomplished during the year by students. Each department on the campus prepares displays that reflect the curriculum within that department and its relation to employment, as well as the activities and success of the graduates. Besides the shows and exhibits there are many entertainment features such as intercollegiate baseball, swimming, and rodeo. Other special events include dramatic presentations, aquacade, carnival, various judging contests that involve adult visitors, and a mathematics contest featuring students from high schools throughout the State.

STUDENT SERVICES

Cal Poly provides a number of services designed to help the student in his college work. Some of the services are directed toward group activities and experiences, others toward helping students overcome individual problems.

COUNSELING SERVICES

Advising

Each new student is assigned an adviser in his major department when he enrolls at Cal Poly. This adviser helps the new student solve problems involved in becoming oriented to college life and helps to arrange a sound course of study for him. Returning students and college transfers are also assigned an adviser who helps the student arrange his instructional program.

Counseling Center

The Counseling Center, under the direction of the Associate Dean, Counseling and Testing offers service in vocational, educational, and personal counseling in accordance with the needs of the student. A well-equipped test center, under the direction of the Test Officer, is available to assist the students and counselors.

FOOD SERVICES

Dining Facilities

The food services on campus are operated by the Cal Poly Foundation and offer a variety of menus, atmospheres and prices to suit student needs and interests. Two campus dining halls provide cafeteria food service by meal ticket plan or individual purchase. The newest facility, Vista Grande, which includes a full-service restaurant and an a la carte cafeteria, offers greater service for more formal occasions, visits with parents, and special celebrations. For quick nutritious snacks the Food Service also operates a snack bar, burger bar, old-fashioned ice cream parlour and vending areas. The variety offered ranges from fast foods and complete meals to catered banquets in the University's regular dining facilities, and in the University Union.

Meals Program

Both resident students and nonresidents may use the a la carte and vending services or choose to purchase one of the optional meal ticket plans. Meal tickets are available from the Foundation Business Office.

HEALTH SERVICES

Health Center

The staff and facilities of the Student Health Center are dedicated to the ideals of preventive, diagnostic and therapeutic medicine. These services are offered with an emphasis on health education. In general, the same approach as that of the

Student Services

student's own family physician is provided. The Health Center staff has several full-time physicians, registered nurses, and medical technologists. The Health Center is comprised of two units: a thirty-bed, fully-accredited hospital and an outpatient department. It provides a well-equipped clinic and hospital with facilities for minor surgery, pharmacy, laboratory, physical therapy, medical records, and diagnostic X-ray facilities.

Health Program

The health program is financed by the student in three steps. For complete medical coverage, each regular student should participate in all three:

- 1) The materials and service fee allows limited outpatient care from 8 a.m. to 5 p.m., Monday through Friday.
- 2) An optional local health fee entitles the student carrying more than 6 units to campus hospitalization and 24-hour emergency care by a campus physician. Additional services under this program are physical therapy and prescription service in the campus pharmacy. Any such student, even without this prepaid campus health plan, may still avail himself of these benefits by paying a fee for service.
- 3) Supplementary major medical and hospital insurance is offered to cover major surgery and emergency expenses.

A health statement on a form provided by Cal Poly is required of each student; the physical examination is optional. Chest X-rays and tetanus immunizations recommended for each new student are provided by the Health Center.

HOUSING SERVICES

On-Campus Housing

On-campus residence hall facilities are available for 2,750 students, both men and women.

A stimulating intellectual and social environment in housing units is an important part of the student's education. Study is encouraged through the observance of regular quiet hours. Residents also have ample opportunity to participate in intra-mural activities, discussion groups, and social events with other halls. This environment is recommended to facilitate social, educational, and cultural adjustments. Each hall is staffed with professional personnel.

New students who wish to live in the residence halls should request on-campus housing when they apply to Cal Poly for admission. Assignment to available on-campus housing is made according to the date of acceptance for admission.

Notification of the availability, or the unavailability, of on-campus housing after acceptance for admission is normally made shortly after June 1 for the Fall Quarter.

Housing licenses are mailed to students accepted for on-campus housing. Signed licenses, accompanied by the required payment, must be returned by the deadline stated in the license. Failure to comply with the license stipulations may result in loss of housing assignment.

LIVING EXPENSES FOR STUDENTS LIVING IN CAMPUS RESIDENCE HALLS

(Subject to change)

Room and Board

†Room, per quarter, annual license required.....	\$200.00
Board, per quarter (optional)	200.00 to 275.00
Board, annual (optional) (academic year).....	750.00
Housing security deposit (payable prior to occupancy).....	20.00

Room payable in advance. Arrangements to pay in installments may be made upon application for campus housing. A service fee of \$4.00 per quarter shall be charged for the right to make installment payments.

† Single occupancy available at a cost of \$270 per quarter.

Students are required to furnish blankets, bed spreads, and study lamps.

Three optional meal ticket plans are available. The Economy Plan provides 19 meals per week at a cost of \$750 prepaid for the academic year or \$275 per quarter. The Premium Plan entitles the owner to a choice of any 15 meals each week at a cost of \$250 per quarter. The Convenience Plan provides any 12 meals each week at a cost of \$200 per quarter. Several credit options are available for all plans through the Foundation Business Office.

Off-Campus Housing

Privately owned and operated off-campus housing is available for both men and women students. The University does not inspect or supervise these facilities. Parents are responsible for the living arrangements of their sons and daughters.

Inquiries about off-campus housing should be made in person at the Housing Office.

Family Housing

The Housing Office maintains a card file of apartments and rooms available to married students. It does not inspect or approve the facilities listed. Inquiries about the file should be made in person at the Housing Office.

PLACEMENT SERVICES

A centralized placement service is available to all students and alumni of the college. The Placement Office and instructional departments work together in assisting students to obtain the most suitable employment consistent with their preparation and experience.

A followup program conducted by the Placement Office includes contacting both the graduate and employer to appraise the effectiveness of the instructional programs in light of employer needs, and the satisfaction of employer and employee.

Teacher Placement

Every candidate for a credential should register with the Placement Office before or during the last quarter prior to completion of the credential requirements. Registration includes the preparation of personal data, and the listing of references for the confidential teacher placement folder which is sent by the Placement Office to school administrators who are considering the candidate for a teaching position. This folder is maintained permanently by the Placement Office for use whenever the teacher wishes to seek a new position. Cooperation of the candidate in keeping information in the folder up to date is necessary for most effective service.

Summer Employment

Students are encouraged to take summer employment in fields related to their major.

The Placement Office receives many summer job listings. Ranchers and businessmen visit the campus in person and large business concerns send recruiters to interview undergraduates for summer employment.

Part-time Employment

In addition to off-campus employment and opportunities for students to earn money through project activities, the University has established a policy of giving a maximum number of students experience by employing them to assist in the operations of the entire campus and farm. The number of campus jobs is greater than in the typical college where regular full-time employees do much more of the work.

Financial Aids

FINANCIAL AIDS

The University has a variety of loan funds, scholarships, awards, and part-time employment opportunities designed to assist students financially. Students who must have assistance in order to complete their college work should read this section carefully. Additional information may be obtained by writing to the Financial Aid Office.

TYPICAL STUDENT EXPENSES

Following is an estimate of typical expenses per quarter for the average California resident student living in campus residence halls. Non-resident students should be prepared to pay additional tuition fees. Of the total amount, the student should be prepared to pay from \$130 to \$180, depending upon his major, at the time of fall quarter registration and approximately the same amount at the time of registration for other quarters.* Charges for room and board are payable in advance.

Associated student card (fall quarter, \$10.00, winter and spring quarters, \$5.00 each)	\$10.00
University union fee (fall quarter, \$7.00, winter and spring quarters, \$6.00 each)	7.00
Health fee—optional (per quarter)	13.00
Materials and service fee (per quarter) (12 units or more)	39.00
Facilities fee	2.00
Room and board with optional annual meal ticket	450.00
Books and supplies (estimated)	75.00 †
Laundry (estimated \$10 per month)	30.00
Estimated total per quarter (approximately 3 months)	\$626.00

SCHOLARSHIPS AND AWARDS

General Information

Scholarships awarded by the University are available to both entering and enrolled students who meet the scholastic and financial need requirements of the University scholarship funds. These scholarships are made available from various sources, usually corporations, individuals, or interested groups outside the campus. Approximately 225 scholarships are awarded yearly.

How to Apply

To be considered for a scholarship, a student or prospective student must complete a scholarship application. Students may secure an application from the Financial Aid Office. A confidential statement is required.

Selection Criteria

Applicants are judged upon their need, scholastic ability, character and participation in school and community affairs. In addition, certain scholarships require special conditions concerning field of study, residence, and other similar factors.

Generally, students must have at least a "B" average to place high enough in the scholarship ratings to be granted an award. However, there are scholarships which are granted to students with a lesser grade average. In some cases need, special qualifications, or a specific field of study will compensate for a lower grade average. It is recommended that a student apply if in doubt.

GENERAL

Freshman or Advanced Scholarships

ALAN PATTEE SCHOLARSHIP (Children of Deceased Peace Officers or Firemen), surviving children, natural or adopted, of California peace officers or firemen killed in the line of duty are not charged fees or tuition of any kind while enrolled at any California State University or College, according to the Alan Pattee Scholarship Act and the Education Code, Section 23762. Students qualifying for these benefits are known as Alan Pattee scholars.

* Students enrolling under the auspices of an agency supplying educational assistance should check in advance with the appropriate agency representative regarding payment of fees and/or costs.

† Beginning engineering and architecture students should be prepared to pay up to \$150 in their first quarter.

CALIFORNIA RURAL REHABILITATION CORPORATION EDUCATIONAL FUND SCHOLARSHIPS, (\$600), awards to students who are residents of California and members of low income farm and ranch families. Application must be filed with the Farm Home administration County Supervisor serving the county in which the applicant resides. This program has been established by the California State Department of Agriculture and the United States Department of Agriculture Farm Home Administration.

CALIFORNIA STATE EMPLOYEES ASSOCIATION, CHAPTER 97, SCHOLARSHIPS, four \$225 awards, one each for a freshman, sophomore, junior and senior student. Preference given to applicants one of whose parents is an active, retired, or deceased CSEA member. Holders of a CSEA scholarship will have preference for renewal if current grade standing is acceptable.

Freshman Scholarship

LULU G. BUMPHREY SCHOLARSHIP, (\$200), to a male graduate from Atascadero Union High School.

HUI-O-HAWAII SCHOLARSHIPS, (\$150) to students who are Hawaiian citizens (3).

Advanced Student Scholarships

CALIFORNIA POLYTECHNIC STATE UNIVERSITY WOMEN'S CLUB SCHOLARSHIP, (\$200), to a senior student.

HERBERT E. COLLINS SCHOLARSHIPS, to worthy students who by their industry, scholarship and ability have proven themselves entitled to special assistance.

GREEN AND GOLD BARBEQUE SCHOLARSHIP, (\$150) to a student demonstrating financial need.



Mrs. Julian A. McPhee presents Julian A. McPhee Award.

JULIAN A. MCPHEE AWARD, (\$200), to an outstanding undergraduate student who has attended the University for at least six quarters as a full-time student. This award was established in memory of Julian A. McPhee, President of Cal Poly from 1933 to 1966. Students are nominated by each School of the University and will be requested to complete a scholarship application.

MUSSELMAN WRESTLING SCHOLARSHIP, (\$100) to a varsity wrestling student.

Financial Aids

AGRICULTURE AND NATURAL RESOURCES

Freshman or Advanced Student Scholarships

CALIFORNIA COWBELLES SCHOLARSHIP, (\$200), to a student in Agriculture who is a graduate of a California high school.

AGNESE DAVEY SCHOLARSHIP, (\$300), female student in Ornamental Horticulture.

TH. R. AND VALLEY M. KNUDSEN FOUNDATION SCHOLARSHIP, (\$600), Dairy Science.

LEOPOLD EDWARD WRASSE SCHOLARSHIPS, (\$500), awards to students in Agriculture with the following qualifications:

(1) of good character, industrious, and in need of assistance; (2) interested in a major agricultural field of study offered by the California Polytechnic State University with sufficient academic preparation and other background to show promise of success; except that Caruthers Union High School students may enroll in any of the schools at the University; (3) active in community or school affairs; (4) having earned a sum equal to one-half of the amount of the award within the 12-month period prior to receiving an award; (5) selected in the following priority: from (a) Caruthers Union High School; (b) high school in Fresno County; (c) other California secondary schools or California Polytechnic State University. Some 100 such scholarships are awarded annually.

Freshman Scholarships

CALIFORNIA STATE GRANGE SCHOLARSHIPS, (\$250), to students in Animal Science, Dairy Science, or Crops Science (2).

CHALLENGE CREAMERY SCHOLARSHIP, (\$200), to a Future Farmer student in Dairy Science.

E. C. LOOMIS AND SONS SCHOLARSHIP, (\$100), to the outstanding graduate in the vocational agriculture department of a San Luis Obispo County or Santa Maria District high school.

SAN LUIS OBISPO COUNTY COWBELLES SCHOLARSHIPS, one \$100 award and one \$200 award to female students in Agricultural Management, Animal Science, Journalism (Agricultural), or Home Economics, who have an interest in the promotion of the use or production of beef. Applicants must be graduates of a San Luis Obispo County high school and resident of the county for one year.

Advanced Student Scholarships

LLOYD ACKERMAN MEMORIAL SCHOLARSHIP, (\$500), to a senior in Food Industries, Crops Science, or Agricultural Management.

L. L. BENNION SCHOLARSHIP, (\$250), to a junior in Animal Science.

CALIFORNIA ASSOCIATION OF NURSERYMEN SCHOLARSHIP, to a sophomore in Ornamental Horticulture.

CALIFORNIA ASSOCIATION OF NURSERYMEN, CENTRAL CHAPTER, SCHOLARSHIP, to a student in Ornamental Horticulture.

CALIFORNIA ASSOCIATION OF NURSERYMEN, PENINSULA CHAPTER, SCHOLARSHIP, (\$150), to a student in Ornamental Horticulture.

CALIFORNIA DAIRY INDUSTRIES ASSOCIATION SCHOLARSHIP, (\$600), to a student in Dairy Science.

CALIFORNIA FERTILIZER ASSOCIATION SOIL IMPROVEMENT COMMITTEE SCHOLARSHIP, (\$200), to a sophomore or junior in Soil Science or Crops Science.

WELLINGTON DAVEY SCHOLARSHIP, (\$300), to a student in Ornamental Horticulture.

DOROTHY BANCROFT DRASEL SCHOLARSHIP, to a student in Ornamental Horticulture.

PAUL ECKE RANCH SCHOLARSHIP, (\$100), to a student in Ornamental Horticulture.

GROUP SEVEN CALIFORNIA BANKERS ASSOCIATION SCHOLARSHIP, (\$500), to a student in Agriculture from San Luis Obispo, Santa Barbara, or Ventura County.

HEARST FOUNDATION SCHOLARSHIPS, (\$500), to students in Agriculture.

WILLIAM (BEN) AND HELEN HOLMAN ALUMNI AGRICULTURE SCHOLARSHIP, interest from a grant awarded yearly to an upper division Agriculture student in financial need and maintaining at least a 2.65 grade point average. To be selected by the Dean of the School of Agriculture and Natural Resources and the President of the Alumni Association in co-operation with the University Scholarship Committee.

KINGS RIVER PRUNE AND APRICOT SCHOLARSHIP, (\$200), to a junior in Agriculture from Kings County.

JAMES F. MERSON MEMORIAL SCHOLARSHIP, annual award to a junior in Agricultural Engineering.

HARRY PARKER MEMORIAL SCHOLARSHIP, award to a junior, senior, or fifth year student in Animal Science with an interest in beef cattle, who has attended California Polytechnic State University at least six quarters as a full-time student.

POULTRYMEN'S COOPERATIVE ASSOCIATION OF SOUTHERN CALIFORNIA SCHOLARSHIP, (\$300), to a student who has completed at least three quarters in Poultry Industry from Fresno, Kings, Los Angeles, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, or Ventura County.

HARRY ROSEDALE MEMORIAL SCHOLARSHIP, (\$100), to a student in Ornamental Horticulture.

SANTA BARBARA COUNTY HORTICULTURE SOCIETY SCHOLARSHIP, (\$100), to a student in Ornamental Horticulture.

GEORGE A. SMITH, JR. SCHOLARSHIP, (\$200), to a student in Animal Science specializing in beef or horses.

TRACTOR AND EQUIPMENT CLUB OF CALIFORNIA SCHOLARSHIP, (\$500), to a student in Agricultural Engineering or Mechanized Agriculture.

WESTERN AGRICULTURAL CHEMICALS ASSOCIATION SCHOLARSHIP, (\$500), to a student in Crops Science.

WESTERN FAIRS ASSOCIATION SCHOLARSHIPS, (\$250), to a student in Agricultural Management displaying interest in Fair Management.

ARCHITECTURE AND ENVIRONMENTAL DESIGN

Freshman or Advanced Student Scholarship

GRUEN ASSOCIATES SCHOLARSHIP, (\$1,800), to a male Afro-American student, resident of Los Angeles County, in Architecture.

Advanced Student Scholarships

BECHTEL CORPORATION SCHOLARSHIP, (\$500), to a student in Architecture.

DORMAN/MUNSELLE ASSOCIATES SCHOLARSHIP, (\$1,000), to a minority person, preferably Afro-American, in Architecture.

FREDERICK PETER YOUNG SCHOLARSHIP, (\$150), awarded Winter Quarter to a sophomore or junior in Architecture. Continuing students apply during Fall Quarter.

BUSINESS AND SOCIAL SCIENCES

Advanced Student Scholarship

SOCIETY FOR ADVANCEMENT OF MANAGEMENT SCHOLARSHIP, (\$300), to a student who is a current S.A.M. member and a member for two prior quarters at Cal Poly.

Financial Aids

COMMUNICATIVE ARTS AND HUMANITIES

Advanced Student Scholarships

H. S. CROCKER COMPANY—ROLAND MEYER MEMORIAL SCHOLARSHIP, (\$1,000), to a student in Graphic Communications.

JOHN HEALEY SIGMA DELTA CHI SCHOLARSHIP, (\$100), to a sophomore or junior in Journalism.

JOHN B. LONG MEMORIAL SCHOLARSHIPS, (\$250), to juniors in Graphic Communications available through the California Newspaper Publishers Association (2).

ENGINEERING AND TECHNOLOGY

Freshman or Advanced Scholarships

WALTER WELLS, SR. MEMORIAL SCHOLARSHIPS, (\$500), to students in Engineering (10).

Advanced Student Scholarship

AIR CONDITIONING REFRIGERATION CENTER OF LOS ANGELES SCHOLARSHIP, (\$400), to a senior in Environmental Engineering.

ALCOA FOUNDATION SCHOLARSHIP, (\$750), to a student in Engineering.

ALPAC SCHOLARSHIP, (\$350), to a junior or senior in Environmental Engineering.

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS SCHOLARSHIPS, (\$400), scholarships to seniors in Environmental Engineering (2).

AMERICAN WELDING SOCIETY, SAN DIEGO SECTION, SCHOLARSHIP, (\$250), to a junior or senior in Welding and Metallurgical Engineering.

AMERICAN WELDING SOCIETY, SANTA CLARA VALLEY SECTION, SCHOLARSHIPS, (\$100), to students in Welding and Metallurgical Engineering (2).

ELECTRIC POWER INSTITUTE SCHOLARSHIPS, (\$150) to students majoring in Electrical Engineering and doing their senior project in electrical power systems (2).

HAROLD R. FRANK—APPLIED MAGNETICS CORPORATION SCHOLARSHIP, (\$500), to a student in Electrical or Electronic Engineering.

GETTY OIL COMPANY SCHOLARSHIP, (\$300), to a senior in Mechanical Engineering.

INSTITUTE OF ELECTRICAL & ELECTRONIC ENGINEERS, SANTA BARBARA SECTION, SCHOLARSHIPS, awards to students in Electronic Engineering or Electrical Engineering.

MINNESOTA MINING AND MANUFACTURING SCHOLARSHIPS, (\$500), awards to students in Engineering (3).

NORTH AMERICAN HEATING AND AIR CONDITIONING WHOLESALERS ASSOCIATION SCHOLARSHIPS, (\$350), to a student in Environmental Engineering.

LEO F. PHILBIN MEMORIAL SCHOLARSHIP, (\$100), to a junior or senior in Aeronautical Engineering.

CLARENCE RADIUS MEMORIAL SCHOLARSHIP, (\$350), to a student in Electronic Engineering.

RAYTHEON COMPANY SCHOLARSHIP, (\$500), to a junior or senior in Engineering.

LARRY REID SCHOLARSHIP, (\$250), to a senior in Mechanical Engineering.

WESTERN ELECTRIC FUND, (\$500), to a student in Engineering.

HUMAN DEVELOPMENT AND EDUCATION

Freshman Scholarship

SAN LUIS OBISPO COUNTY COWBELLES SCHOLARSHIPS, one \$100 award and one \$200 award to female students in Agricultural Management, Animal Science, Journalism (Agricultural), or Home Economics, who have an interest in the promotion of the use or production of beef. Applicants must be graduates of a San Luis Obispo County high school and residents of the county for one year.

Advanced Student Scholarships

ALTRUSA CLUB OF SAN LUIS OBISPO SCHOLARSHIP, (\$50) to a graduate student in Home Economics.

DELTA KAPPA GAMMA—EPSILON DELTA GRANT, (\$100), to a fifth year female student in Education.

HOME ECONOMICS CLUB SCHOLARSHIP, (\$250), to a student in Home Economics. Must be a member of the California Home Economics Club.

JOHN AND DOROTHY MANNING SCHOLARSHIP, (\$200), to a junior or senior in Elementary Education.

PARENT-TEACHERS SCHOLARSHIPS, one \$500 award to junior, senior, or graduate students in Elementary Education, and one \$500 award to a junior, senior, or graduate student in Secondary Education, who are preparing to teach in public schools of California, available from California Congress of Parents and Teachers, Inc.

SCIENCE AND MATHEMATICS

Advanced Student Scholarship

APPLEGARTH BIOLOGY SCHOLARSHIP, (\$100) to a student in Biological Sciences.

HATFIELD MEMORIAL AWARD, to a student in Biological Sciences.

OTHER SCHOLARSHIPS

In addition to the scholarships awarded by the University, the following awards from various private donors and organizations are available to assist students in meeting University expenses. Interested students should make inquiries for such awards directly to the sponsoring organization or to the Financial Aid Office.

American Institute of Architects, Santa Barbara Chapter, Award (Architecture)

Bank of America, N.T. & S.A. Scholarships (Agriculture)

Bank of America Minority Scholarships (Education)

Business and Professional Women's Club of San Luis Obispo Scholarship

California Seed Association Scholarship (Agriculture)

Theresa Corti Scholarships (Agriculture)

Dr. Albert Gazin Award (Architecture)

Robert E. Holmquist Memorial Scholarship

International Brotherhood of Electrical Workers Founders' Scholarships (Electrical Engineering)

Martin Luther King Jr. Memorial Scholarships

Plastering Industry Promotion Bureau Scholarship (Architecture)

ROTC Scholarships (Military Science)

Rotary Scholarships

Safeway Stores, Inc. Scholarships (Agriculture)

Santa Barbara Foundation Scholarships

Santa Barbara Scholarship Foundation Grants

Santa Fe Scholarship (Agriculture)

South San Francisco and Stockton Union Stockyards Company Scholarships (Agriculture)

Southern Counties Gas Company and Southern California Gas Company Awards (Architecture)

Standard Oil Company of California Scholarships (Agriculture)

Union Oil Company Scholarships (Industrial Technology)

Union Pacific Railroad Scholarships (Agriculture)

Financial Aids

NATIONAL EDUCATION ACT LOAN

The National Direct Education Act Loan provides up to \$1,000 a year for a five-year period, allowing a potential total accumulation of \$5,000. These loans are paid back one year after the borrower leaves college with repayment over a 10-year period at 3% interest on the unpaid balance. No interest is charged until after the student leaves college.

Cancellation provisions are available for students who teach in designated low-income areas or who teach the handicapped.

The National Direct Education Act also broadens to include cancellation in the Armed Forces. Such cancellation applies only to loans for military service performed after June 30, 1970. Cancellation will be at the rate of 12½% of the total amount of such loans (plus interest) for each year of consecutive military service (not to exceed 50% of the total loan).

Applications for this program are due by June 1 of each year for the following college year. A Parents' Confidential Statement is required.

STUDENT LOAN FUNDS

Student loan funds are available to provide temporary assistance to eligible students. Loans from these funds are made for varying periods of time, according to regulations determined by a faculty committee and in conformance with conditions prescribed in the establishment of the particular loan fund. Applications may be obtained from the Financial Aid Office, Administration 107.

The character and integrity of the student are the primary qualifications for obtaining a loan. Evidence of real need for such temporary assistance must be shown. Students who have spent funds far beyond the necessary school expenses will not be considered for loans, even though need is shown.

Agricultural Engineering Society Loan Fund
Alpha Zeta Loan Fund
Alumni Association Loan Fund
American Society of Heating, Refrigerating
and Air Conditioning Engineers Loan Fund
Pete Bachino Memorial Loan Fund
Baer-Beck Fund
Edgar E. Bilodeau Loan Fund
Jed S. Blake Memorial Loan Fund
California Association of Refrigeration Service
Engineers Loan Fund
California Association of Resource
Conservation Districts Loan Fund
California Polytechnic Memorial Loan Fund
California Retired Teachers' Loan Fund
California Polytechnic State University
Women's Club Fund
W. B. Camp Educational Loan Fund
Logan S. Carter Loan Fund
Margaret Chase Memorial Loan Fund
Herbert E. Collins Student Loan Fund
Thomas Comer Memorial Loan Fund
Harlan Diedrichson Fund

Court Evergreen, Independent Order of
Foresters Loan Fund
Barbara Hammonds Memorial Loan Fund
Ralph Hoover Memorial Loan Fund
Horseshoeing and Animal Husbandry Loan
Fund
International Students Emergency Loan Fund
Chris Jespersen Fund
Anita Hathaway/KEMA Fund
Fred Kimball Loan Fund
William Kirkpatrick Memorial Loan Fund
Lee Gird Levering Memorial Loan Fund
Lynn T. Lobaugh Memorial Loan Fund
William Mercer Memorial Loan Fund
1960 Football Team Memorial Fund
Rotary Club Fund
Sears Roebuck Foundation Loan Fund for
Foreign Students
George Sehlmeier Memorial Fund
Norma Sullivan Memorial Loan Fund
Telegram Tribune Loan Fund
Todd Farm Bureau Emergency Loan Grant
Wilder Memorial Loan Fund

STUDENT GUARANTEED LOAN PROGRAM

Federally-sponsored long-term loan programs with largely the same terms as the National Direct Student Loan Program, but with no teacher cancellation provisions.

UNITED STUDENT AID FUND

United Student Aid Fund is a private non-profit corporation which endorses low-cost loans by participating banks to college students. The University participates in this program by providing a specified amount of matching funds which allows the University to recommend students for such bank loans. Students who

have completed their freshmen year may borrow from a bank up to \$1,000 a year at 7 percent simple interest with repayment beginning after graduation or separation from college. For a student who qualifies under federal law, the federal government will pay all the interest until payments are due to begin.

Other organizations and funds also have provided matching amounts which make possible recommendation of additional student loans, some of them to specified categories of students. These organizations and funds (many of which also make student loans directly) are:

Alpha Zeta Loan Fund

Alumni Association Loan Fund

Architecture (A.I.A.) Fund

Baer-Beck Fund

California Cowbells

California Polytechnic State University
Foundation

California Polytechnic State University
Women's Club Fund

Joseph Cardani Memorial Loan Fund

Class of 1964 Loan Fund

Thomas W. Flower Memorial Fund

Green and Gold BBQ Fund

Jack Bertram and John Lee Loan Fund

Roy F. Metz Memorial Loan Fund

Clarence Radius Memorial Fund

Larry Reid Loan Fund

James Ritchie Loan Fund

Norman Sharpe Fund

Lester Whitney Memorial Fund

EDUCATIONAL OPPORTUNITY GRANT PROGRAM

A grant-in-aid program intended to assist undergraduate students who, without substantial aid such as this, could not attend college. Eligibility is restricted to students from families with very low income. The aid must be matched by a National Direct Loan or similar aid.

Educational Opportunity Grant applicants must submit a Parents' Confidential Statement or a Student's Confidential Statement.

LAW ENFORCEMENT EDUCATIONAL GRANT PROGRAM

Grants for the mandatory fees required by the University are made available to in-service law enforcement officers through a Federal program. Applicants may enroll on a full or part-time basis and must agree to serve in the employing agency for a period of at least two years following completion of their studies.

Under provisions of the Alan Pattee Scholarship Act required fees and tuition are waived upon application for students who are surviving children of a law enforcement or fire suppression officer killed in the performance of his duties.

MERLE HAMBLY FUND PROGRAM

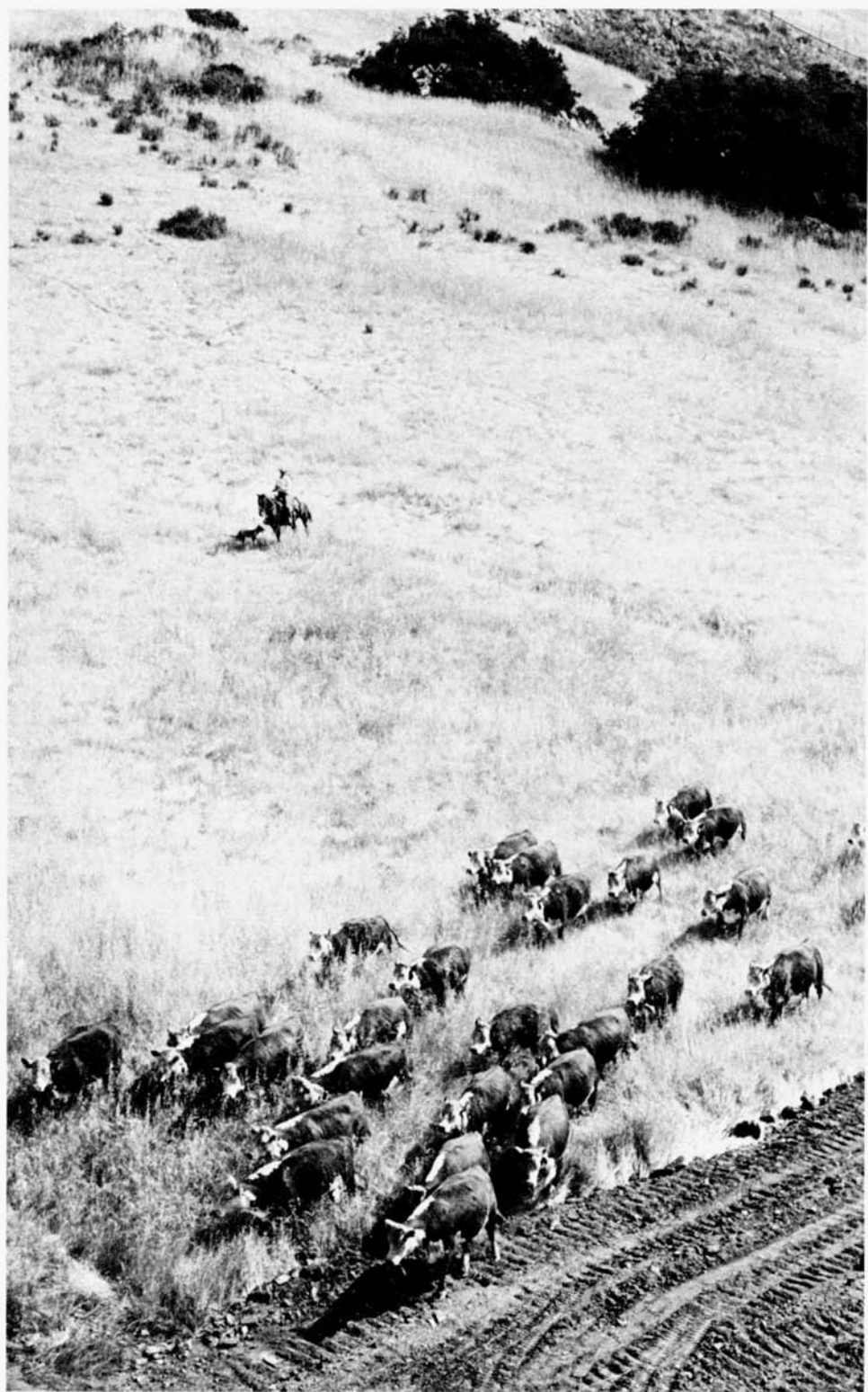
A fund established by the California Polytechnic State University Student Wives Club provides for grants to assist the married student whose child has met with an accident or otherwise requires immediate medical care of an emergency nature.

STATE AID TO THE PHYSICALLY HANDICAPPED

The State of California, through its Bureau of Vocational Rehabilitation, provides financial assistance to students who have physical disabilities. This assistance equals the necessary school expense and may include an additional amount to help cover the cost of living. Students who may be entitled to the assistance should apply to the State Bureau of Vocational Rehabilitation.

WORK STUDY PROGRAM

The University is participating in the Work Study Program which provides students who are eligible the opportunity of employment as set forth under the Economic Opportunity Act. Employment provisions under this program are parallel to those of other student employment on campus. Rates of pay vary depending on the job requirements and the skills of the worker. A Parents' Confidential Statement or a Student's Confidential Statement is required. Information may be obtained from the Financial Aid Office, Administration 107.



SCHOOL OF AGRICULTURE AND NATURAL RESOURCES



CHART OF RECOMMENDED COMMUNITY COLLEGE PREPARATION FOR AGRICULTURE MAJOR CURRICULA

Recommended C. C. Preparation in Terms of Cal Poly Courses	Approximate units		CAL POLY AGRICULTURE MAJORS REQUIRING VARIOUS COURSES ¹											
	Qtr.	Sem.	Ag. Bus. Mgmt.	Ag. Engr.	Animal Sci.	Crops & Fruit	Dairy Sci.	Farm Mgmt.	Food Ind.	Mech. Ag.	Nat. Res. Mgmt.	Orn. Hort.	Poultry Ind.	Soil Sci.
<i>Biological Sciences</i>														
Bio 110, Applied Biology.....	3	2		X	X	X	X	X		X	X	X	X	X
Bot 121, General Botany.....	4	3				X						X		X
Ent 126, Entomology.....	4	3			X	X	X	X			X	X	X	
Zoo 131, General Zoology.....	4	3			X				X		X	X	X	
Zoo 132, General Zoology.....	4	3			X	X								X
Bact 221, Bacteriology.....	4	3												
Life Science.....	7	5	X											
<i>Physical Sciences</i>														
Phys 104, Introductory Physics.....	4	3							X					
Phys 121-2-3, Physics.....	12	8								X				
Phys 131-2-3, Physics for Engrs.....	12	8	X	X	X	X	X	X	X				X	X
Chem 121-2, 226, Inorganic & Organic.....	12	8	X	X						X				
Chem 121-2, Inorganic.....	8	5												
<i>Mathematics</i>														
Math 100-200, Basic Math.....	6	4	X		X	X	X	X	X				X	X
Math 102-3, Ag. Math, or 113-14.....	6	4												
Math 113-14, Algebra & Trig.....	6	4		X										
Math 117-141, Anal. Geo. & Calc.....	9	6												
<i>Agriculture & Supporting Courses</i>														
AE 121-2, Ag. Mechanics.....	4	3	X		X	X	X	X	X	X	X	X	X	X
AE 142, Ag. Power & Machinery.....	4	3	X	X	X	X	X	X	X	X	X	X	X	X
SS 124, Soils.....	4	3	X	X	X	X	X	X	X	X	X	X	X	X
Ec 201 or 211, Economics.....	3	2	X	X	X	X	X	X	X	X	X	X	X	X
Actg 131-2, or 221-2 Accounting.....	6	4	X	X	X	X	X	X	X	X	X	X	X	X
Ag Major or Related Courses.....	18	12	X	X	X	X	X	X	X	X	X	X	X	X
Subtotals (Semester Units).....	--	--	41	47	44	44	41	42	39	45	41	45	44	41
General Education Courses ²	--	--	23	23	26	26	29	28	31	25	29	25	26	29
Maximum Transfer Units.....	105	70	70	70	70	70	70	70	70	70	70	70	70	70

¹ The prospective transfer student should consult the curriculum requirements specified in this catalog for his particular major, including possible options and concentrations.

² Recommended courses include English, American History, American Government, Psychology, Speech, Literature, Physical Education and Health, etc.

SCHOOL OF AGRICULTURE AND NATURAL RESOURCES

J. Cordner Gibson, Dean
John W. West, Associate Dean

The School of Agriculture and Natural Resources prepares students in the field of agriculture with the main objective of giving them a broad and full understanding of basic factors involved in production, management, processing, distribution, marketing, sales, and services in related business to make efficient operators and managers. While the school stresses production techniques and basic management to benefit those returning to the farm or entering employment in other agricultural fields upon leaving college, it also requires a core of basic science courses related to the major and a substantial block of general education courses necessary to prepare the student to take his rightful place in a democratic society.

This preparation also provides the sound basis necessary for the student desiring to become a teacher of agriculture in California's secondary schools and community colleges.

Curricula in the School of Agriculture and Natural Resources are arranged so that the student receives a maximum of production courses in his major field early in the program. The student who terminates his formal education prior to graduation, has thus acquired knowledge and experience which make him immediately employable. In addition, the student is able to determine in a short time whether or not he is fitted for the curriculum he has selected.

Furthermore, the early acquisition by the student of practical, "doing" types of activities provides him with the incentive to learn basic scientific explanations.

The courses offered in each agricultural curriculum may be grouped into four areas as follows:

1. Major agriculture—The required sequence of courses offered by the department in which the student expects to graduate. These courses constitute the core of specific preparation for the major field.
2. Related agriculture—Supporting courses in agriculture selected from closely allied fields. They supplement the major agriculture block in (1).
3. Science and mathematics—Courses selected from scientific fields which provide basic biological, physical, and social science, and mathematical background and support for the agricultural blocks in (1) and (2) above.
4. Humanistic and social—Courses which provide cultural background for intelligent participation in a complex world society.

The School of Agriculture and Natural Resources utilizes the student enterprise program of the California Polytechnic State University Foundation to provide practical experience which supplements the regular production courses. This enterprise program leads to a fuller understanding of important production and managerial problems in agriculture.

RECOMMENDED PREPARATION

Admission to the School of Agriculture and Natural Resources requires high school graduation, with appropriate grades and aptitude test scores, but does not require that a specific pattern of courses be taken in high school. However, a student who anticipates enrolling in an agricultural major will find a strong background in mathematics and physical and biological sciences to be advantageous.

Attention is directed to the chart on the preceding page which summarizes the recommended community college preparation for agricultural major curricula. This chart should be studied and followed carefully in order to prevent loss of time in completing the degree program after transferring to Cal Poly.

PROGRAMS

Curricula are offered in the following majors in the School of Agriculture and Natural Resources: agricultural business management, agricultural engineering, animal science, crop science, dairy science, farm management, food industries, fruit science, mechanized agriculture, natural resources management, ornamental horticulture, poultry industry, and soil science.

Agriculture

The Agricultural Education Department provides an additional program of courses required of prospective secondary agriculture teachers.

The Veterinary Science Department offers courses supportive of the animal science and dairy science majors.

The Animal Science Department offers a 12-week course in horseshoeing in the fall and spring quarters.

MASTER OF SCIENCE IN AGRICULTURE

The School of Agriculture offers a program of graduate study leading to the degree of Master of Science in Agriculture. This broadly-based program is designed to develop professional competencies for positions in agriculture and related industries, teaching, business, and government work which now require levels of preparation beyond the baccalaureate degree. Specializations are currently available in the areas of General Agricultural Sciences, International Agriculture, and Soil Conservation.

CURRICULUM FOR THE MASTER OF SCIENCE IN AGRICULTURE DEGREE WITH A SPECIALIZATION IN GENERAL AGRICULTURAL SCIENCES

(For University requirements see the *Graduate Study Bulletin*)

	<i>Units</i>
Courses in area of specialization	24
The 24 units of 400 and 500 series courses must be distributed among a minimum of three departments in the School of Agriculture and Natural Resources. Fifteen units must be at the 500 level.	
Courses other than in the area of specialization	15
These are to be selected from 300-400-500 series courses as approved by the student's graduate adviser or committee from such areas as Agricultural Education and Education. Eight units must be at the 500 level.	
Electives from 300-400 level courses	6
	<hr/> 45

CURRICULUM FOR THE MASTER OF SCIENCE IN AGRICULTURE DEGREE WITH A SPECIALIZATION IN INTERNATIONAL AGRICULTURE

(For University requirements see the *Graduate Study Bulletin*)

	<i>Units</i>
Courses in the area of specialization:	
ABM 515 International Agricultural Marketing	3
ABM 516 Communication for Change in Developing Countries	3
FM 520 World Agricultural Development	3
Courses in agriculture at the 500 level as approved by the student's graduate committee, at least 8 units:	8
Courses in agriculture to be chosen from the 300 level or above	7
	<hr/> 24
Courses outside the area of specialization	
AgEd 580 Special Problems in Agricultural Education	3
PolSc 590 Seminar	3
Courses selected from the following:	
Geography, Political Science and History of one selected world regional area (Latin America, Africa south of the Sahara, North Africa and the Middle East, or Asia and the Far East), 300 or 400 level courses as approved by the student's graduate committee.	
The student must develop and demonstrate language competency as required by his graduate committee	
	9 15
Electives from 300, 400, and 500 level courses	6
	<hr/> 45

CURRICULUM FOR THE MASTER OF SCIENCE IN AGRICULTURE DEGREE WITH A SPECIALIZATION IN SOIL CONSERVATION

(For University requirements see the *Graduate Study Bulletin*)

Courses in the area of specialization:		Units
NRM 502	Resource Conservation	3
SS 508	Conservation Legislation	3
SS 521	Soil Morphology	3
SS 581	Graduate Seminar in Soils	3
SS 582	Graduate Seminar in Land Management	3
SS 599	Thesis or Internship	9
		<hr/> 24
Courses other than in the area of specialization:		
Courses to be selected from the 300-400-500 series outside the area of specialization and approved by the student's graduate committee.		
At least six units must be in 500 level courses		15
Electives from 300, 400, and 500 level courses		6
		<hr/> 45

CURRICULUM FOR THE MASTER OF SCIENCE IN AGRICULTURE DEGREE WITH A SPECIALIZATION IN MECHANIZED AGRICULTURE

(For University requirements see the *Graduate Study Bulletin*)

Courses in the area of specialization:		Units
AE 521	Engineering of Agricultural Equipment	4
AE 522	Agricultural Process Engineering	4
AE 533	Advanced Irrigation System Design	4
AE 581	Graduate Seminar in Agricultural Engineering	3
AE 599	Thesis, Internship or Approved Courses	9
		<hr/> 24
Courses other than in the area of specialization:		
Courses to be selected from the 300-400-500 series outside the area of specialization and approved by the student's graduate committee. At least six units must be in 500 level courses		15
Electives from 300, 400, and 500 level courses		6
		<hr/> 45

TECHNICAL CURRICULA IN AGRICULTURE

In keeping with the collegewide policy of offering major courses which lead to occupational competency from the beginning of the first year of the four-year sequence, it is essential to provide opportunity for students who may find it impossible to complete four-year programs, to obtain as early as possible a concentration of production courses with a minimum of supporting material.

A technical two-year curriculum is available in each of the following agriculture areas: agricultural business management, mechanized agriculture, animal science, dairy husbandry and manufacturing, farm management, crops science, fruit science, food processing, ornamental horticulture, poultry industry, and soil science. These curricula include a smaller number of units of related and general education courses than are included in the degree programs. This permits the student to acquire the basic fundamentals in the major of his selection and a greater freedom of choice of subjects in agricultural production courses. A student not wishing to enroll in a degree curriculum will find that a two-year curriculum offers a maximum opportunity to select courses which will greatly assist him in agriculture after graduation. For admission requirements see "Requirements for Admission as an Undergraduate Student."

Upon completion of 98 selected units, a student may receive a technical certificate in the field of his major.

A student enrolled in the technical program will not be allowed to enroll for credit in any 300 or 400 series courses except when prior approval has been obtained by petition for special consideration.

Agriculture

The following is the two-year technical curriculum for animal husbandry. Other majors follow a similar pattern. Detailed curriculum information is available from the Dean of the School and department heads.

Freshman	F	W	S
Feeds and Feeding (ASci 101).....	4		
Market Beef Production (ASci 121).....	4		
Elements of Swine Production (ASci 122).....		4	
Elements of Sheep Production (ASci 123).....			4
Agricultural Mechanics (AE 121, 122).....		2	2
* Applied English Composition (Engl 100).....	3		
Agricultural Math (Math 102).....		3	
Physical Education Activity.....	1	1	1
* Agricultural Biology (Bio 100).....		3	
Soils (SS 121).....			4
Electives	4	3	5
	16	16	16
Sophomore			
Sheep Husbandry (ASci 221).....	4		
Commercial Beef Production (ASci 222)		4	
Swine Management (ASci 223)			4
Agricultural Power and Machinery Management (AE 142).....	4		
* Prin. of Livestock Hygiene and Sanitation (VS 100).....		5	
Forage Crops (CrSc 123)			4
* Farm Records and Farm Mgt. Practice (FM 102).....	4		
Health Education (PE 250).....			2
* U.S. Hist. and Government (Pol Sc 100).....		3	
Farm Management or ABM Elective.....	3		
Electives	2	5	6
	17	17	16

A student enrolled in the technical program may not transfer to a degree program except by following the approved college procedure for such transfers.

The following specialization areas are available to two-year technical students in Animal Science: Beef Cattle Production, Horse Production, Feed Mill Operation. One of these may be selected with the approval of the adviser.

AGRICULTURAL ENTERPRISE PROJECT FACILITIES

The entire farm with its equipment, buildings, and livestock is available to students for their use in conducting a wide variety of agricultural enterprise projects.

The University foundation has some of the best breeding flocks and herds of livestock in the State. Many show champions have come from the beef herd, which includes Herefords, Angus, and Shorthorns, offsprings of which are sold to the students. All necessary equipment for beef cattle production—barns, dehorning and loading chutes, corrals, stock horses, etc., is available.

The foundation swine herd consists of two major breeds—Yorkshires and Hampshires. The facilities include a 12-unit farrowing house and outside lots and pastures for the brood sows. In addition there are 20 feeder units for student projects having a capacity of approximately 20 market hogs per unit. Student projects market between 700 and 800 fat market hogs each year.

* These courses are taken in place of the required courses in the same subject matter fields listed in the degree curricula in the first two years and may not be used as credit toward a degree. VS 100 is replaced by CrSc 100 for plant majors.

All two-year technical students are required to take Math 102. Students in Mechanized Agriculture are required to take Math 102 and 103.

The foundation breeding flock of sheep is made up of four breeds—Hampshire, Suffolk, Corriedale, Southdown. From 20 to 40 breeding ewes are maintained in each of the breeds, giving the students an opportunity of carrying on typical purebred breeding operations. There are student project facilities for approximately 400 to 500 market lambs that are fed for market each year. Students also have the opportunity of learning shearing and care of wool as well as lamb production.

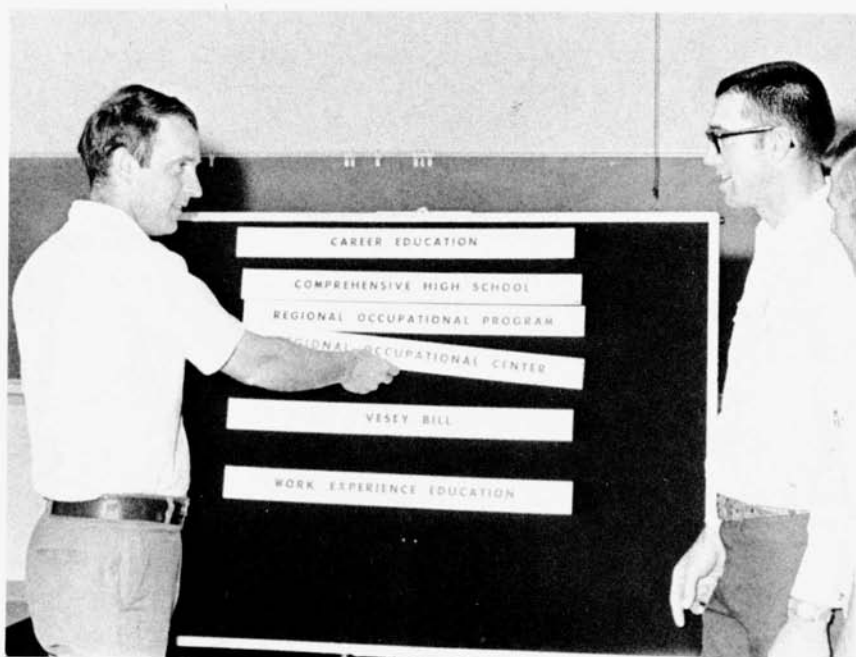
The dairy herd includes purebred Jerseys, Guernseys, and Holsteins. Equipment includes all the necessary facilities for feeding and milking, care of calves and bulls, artificial insemination, milk testing, bottling, separating, and creamery operations. Students conducting dairy projects carry out their operations on a separate part of the campus farm.

The poultry flock consists of between 3,500 and 4,000 birds. The equipment includes a modern incubator, egg-handling facilities, brooders and brooder houses, pens for trap-nesting and pedigree work, and related devices. A student assistant and the students themselves care for every operation under the supervision of the department head.

The Ornamental Horticultural Department occupies a unit consisting of eight greenhouses and three lath houses together with a sales unit and two large labs used for nursery instruction. Student projects are operated in all phases of nursery work. Equipment includes all of the essential machinery necessary for operation of a modern unit.

The Crop Science Department is well equipped with all types of machinery found on mechanized farms in California. All of the farming operations are carried on by students under the supervision of the Crops and Farm Departments through project class work or paid student labor. Orchards, vineyards, crop land, fruit and vegetable packing facilities and marketing outlets are available for instructional purposes.

The Agricultural Engineering Department operating and servicing all of the mechanized equipment on the campus has many opportunities for students to learn practical farm machinery maintenance and repair. The major part of the maintenance work is handled by students under faculty supervision.



AGRICULTURAL EDUCATION DEPARTMENT

Department Head, Osmund S. Gilbertson

Larry P. Rathbun

Joseph E. Sabol

The primary function of the Agricultural Education Department is to provide for the preparation of teachers of agriculture for the public secondary schools of California. Specialized pre-professional and professional courses are offered for undergraduate and graduate students. The basic technological, scientific, and broad general education course work for agriculture teaching candidates is offered throughout the School of Agriculture and Natural Resources and other schools of the University.

Undergraduate students interested in preparing to become teachers of agriculture must enroll in an agriculture major and obtain a B.S. degree in agriculture. The undergraduate major may be selected in any of the agricultural science, production or management fields. Students with baccalaureate degrees enroll as graduate students in agriculture.

Undergraduate students preparing for the teaching of agriculture will be advised primarily by an adviser in the selected agricultural major department. They may pursue a program in agricultural education with the assistance and approval of their major department adviser in course planning and scheduling.

The operational procedures and specific requirements for implementing the Ryan Bill (AB 122) providing for teacher certification are not known at the time of printing this catalog. Interested students should consult the Agricultural Education Department for advice and guidance. Course work toward the teaching credential should be started in the first or second year in order most effectively to complete the total curriculum.

Candidates for the teaching credential should inquire concerning admission to the teacher education program in agriculture through the Agricultural Education Department.

Agricultural education courses may be used to fulfill twenty-four of the forty-five units required for the Master of Science in Agriculture degree with a specialization in General Agricultural Sciences. Detailed information may be obtained in the office of the Dean of the School of Agriculture and Natural Resources.

See COURSES OF INSTRUCTION section of this catalog for description of courses in Agricultural Education and other subjects.

AGRICULTURAL ENGINEERING DEPARTMENT

Department Head, Lloyd H. Lamouria

James Bermann

Robin R. Grinnell

Glenn W. Salo

Edgar J. Carnegie

Willard H. Loper

Rollin D. Strohmman

Frank G. Coyes

Robert M. Matheny

James P. Webster

John E. Dunn

John L. Merriam

Gerald L. Westesen

Larry J. Glass

Clive O. Remund

James B. Zetzsche, Jr.

Glenn W. Rich

A student in this department may choose one of two majors: Agricultural Engineering or Mechanized Agriculture. Also available are a two-year technical certificate program in Mechanized Agriculture and specialized study in Maricultural Engineering (engineering support for sea farming).

Agricultural Engineering. A combination of engineering and agricultural courses designed to provide graduates with a technical and practical background for engineering support of agriculture. Opportunities are available in such diverse areas as prime movers, soil conditioning and moving equipment, harvesting and product

Agricultural Engineering

handling equipment, products processing, agricultural structures. Water management opportunities are also available in such areas as irrigation, drainage, hydrology, flood control, research and administration.

Mechanized Agriculture. This major gives the student broad agricultural training with emphasis on the applied mechanical phases of agriculture. This curriculum is intended for the student who plans to own or manage a farm, teach vocational agriculture with emphasis on farm mechanics, or do sales and service work in the farm machinery and equipment field (wholesale or retail).

This department also gives training in the mechanical and engineering phases of agriculture to students majoring in other departments of the School of Agriculture and Natural Resources.

Two buildings containing eight laboratories and two classrooms, together with a large modern farm machinery and equipment building provide excellent facilities. A wide variety of tractors and farm machinery is available for class use and students are provided with ample opportunity for the application of mechanical and engineering know-how to practical production problems in using thousands of acres of college farm as a laboratory.

The program in agricultural engineering is recognized as a professional curriculum by the American Society of Agricultural Engineers. The student branch of the ASAE offers an active program of professional and extra-curricular events. Enterprise project activity is also available and encouraged.

Students interested in the two-year technical certificate in Mechanized Agriculture should refer to the introductory statement for the School of Agriculture and Natural Resources which describes this program. Detailed curriculum information is available from the department head.

CURRICULUM IN AGRICULTURAL ENGINEERING

Freshman	F	W	S
Introduction to Agricultural Engineering (AE 100).....	1		
Agricultural Mechanics (AE 128).....	2		
Power and Machinery (AE 143).....		4	
Engineering Surveying (AE 237).....			2
Analytic Geometry and Calculus (Math 141, 142, 143).....	4	4	4
Freshman Composition (Engl 104, 105).....	3	3	
Applied Descriptive Geometry (ET 141).....		2	
Engineering Drawing Systems (ET 142).....			2
Soils (SS 121).....			4
* Physical Education.....	1	1	1
General Inorganic Chemistry (Chem 121, 122).....		4	4
** Elective.....	4		
	15	18	17
Sophomore			
Agricultural Structures Planning (AE 232).....			3
Principles of Irrigation (AE 236).....	4		
Economics (Econ 211).....			3
Digital Computer Applications (Engr 251).....	2		
Manufacturing Processes (MP 141).....			1
General Biology (Bio 101).....		3	
Analytic Geometry and Calculus (Math 241).....	4		
Differential Equations (Math 242).....		4	
General Physics (Phys 131, 132, 133).....	4	4	4
Engineering Mechanics (ME 211, 212).....		3	4
Principles of Speech (Sp 200).....		3	
Manufacturing Processes (Weld 141, 142).....		1	1
** Elective.....	3		
	17	18	16

Agricultural Engineering

Junior	F	W	S
Irrigation Systems Design (AE 331).....		3	
Dynamic Measurement (AE 338)		3	
Engineering Properties of Agricultural Materials (AE 333).....			3
Hydraulics (AE 312).....	4		
Hydrology (AE 315).....		3	
Off-the-road Locomotion (AE 326).....			3
Agricultural Process Engineering (AE 327)			3
Electrical Circuit Theory (EE 201).....	4		
Thermodynamics (ME 302)	3		
Strength of Materials (Aero 207)		5	
Strength of Materials Laboratory (Aero 229)		1	
Manufacturing Processes (MP 142)			1
American Government (Pol Sc 201).....	3		
Statistical Analysis (Stat 321).....	3		
* Humanities elective			3
* Literature or philosophy elective			3
** Electives		2	2
	17	17	18
Senior			
Irrigation Engineering (AE 414)			4
Equipment Engineering (AE 421, 422)	3	3	
Agricultural Structures Design (AE 433).....	3		
Reinforced Concrete (AE 434)		3	
Senior Project (AE 461, 462)	2	2	
Undergraduate Seminar (AE 463)			2
Agricultural Systems Engineering (AE 403)			3
Soil Mechanics (Arc E 421).....	3		
Growth of American Democracy (Hist 204)		3	
U.S. in World Affairs (Hist 205)			3
Human Values in Engineering (Hum 402)			3
Engineering Economy (IE 414)	3		
Mathematics elective		3	
* Literature or Philosophy		3	
* Social Sciences	3		
** Elective			2
	17	17	17

CURRICULUM IN MECHANIZED AGRICULTURE

Freshman			
Introduction to Agricultural Engineering (AE 100).....	1		
Agricultural Mechanics (AE 128).....		2	
Agricultural Tractors and Equipment Skills (AE 141).....	3		
Agricultural Power and Machinery Management (AE 142).....			4
Algebra (Math 113).....	3		
College Algebra (Math 114).....		3	
Trigonometry (Math 115).....			3
Computer Applications to Agriculture (AM 250).....		2	
Freshman Composition (Engl 104, 105)	3	3	
Agricultural Drafting (AE 133).....			2
Manufacturing Processes (MP 151, 141, 142).....	1	1	1
Manufacturing Processes (Weld 141, 142).....		1	1
Fundamentals of Metallic Arc Welding (Weld 155).....			1
Plant production elective.....	4		
Soils (SS 121).....		4	
Animal production elective.....			4
* Physical Education	1	1	1
	16	17	17

* To be selected in accordance with the General Education requirement.

** At least 4 of the elective units must be selected from courses in the School of Agriculture and Natural Resources.

Agricultural Engineering

Sophomore	F	W	S
Basic Accounting (Actg 131).....		3	
Agricultural Building Construction (AE 231).....	3		
Agricultural Power Transmission (AE 234).....	3		
Agricultural Power (AE 335).....		3	
Engineering Surveying (AE 237, 238).....		2	2
Gasoline Engine Diagnosis (AE 341).....			3
College Physics (Phys 121, 122, 123).....	4	4	4
General Botany (Bot 121).....		4	
Agricultural Business Sales and Service (ABM 201).....	3		
Agricultural Credit and Finance (AM 310).....			3
* Humanities elective.....	3		
Principles of Speech (Sp 200).....			3
Electives.....	1	2	2
	17	18	17
Junior			
Agricultural Equipment Projects (AE 344).....			3
Agricultural Products Handling (AE 323).....			3
Agricultural Building Planning (AE 332).....			3
Principles of Agricultural Machinery (AE 322).....		3	
Irrigation (AE 340).....	4		
Closed Circuit Hydraulics (AE 301).....	3		
Project Analysis (AE 343).....		4	
General Inorganic Chemistry (Chem 121, 122).....	4	4	
General Psychology (Psy 202).....		3	
Report Writing (Engl 218).....			3
Business Law Survey (Bus 201).....			3
Economics (Ec 201 or 211).....	3		
† Electives.....	2	2	1
	16	16	16
Senior			
Principles of Agricultural Electrification (AE 324).....	3		
Agricultural Electric Power and Controls (AE 325).....		3	
Senior Project (AE 461, 462).....	2	2	
Undergraduate Seminar (AE 463).....			2
American Government (Pol Sc 201).....	3		
Growth of American Democracy (Hist 204).....		3	
U.S. in World Affairs (Hist 205).....			3
Principles of Engineering Economy (IE 403).....		3	
* Literature or Philosophy.....	3	3	
† Electives.....	5	2	11
	16	16	16

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Agricultural Engineering and other subjects.

* To be selected in accordance with the General Education requirement.

** At least 4 of the elective units must be selected from courses in the School of Agriculture and Natural Resources.

† 8 units must be selected from courses in the School of Agriculture and Natural Resources.

AGRICULTURAL MANAGEMENT DEPARTMENT

Department Head: Edgar A. Hyer

Daniel C. Chase
Gaylord J. Chizek
Arthur C. Duarte
Warren S. Farrell

Gerry R. Flake
Douglas G. Genereux
Harold D. Morris
John A. Rogalla

Jack F. Scott
Duane O. Seaberg
David J. Schaffner
Leslie J. Vanoncini

Two major curricula are offered by the Agricultural Management Department and are designed to prepare students for careers in agricultural business management or farm management.

Graduates in both the Agricultural Business Management and Farm Management majors have entered the fields of vocational agriculture teaching and agricultural extension service as well as government employment and agricultural industry.

Both majors are based upon a firm foundation in production agriculture as a basis for sound management preparation. Each program combines the agricultural and business training required for success in farm-related business careers or in farm management careers. The modern farmer is primarily a specialist who confines his operations largely to the production and management of crops and livestock. He depends upon farm-related businesses for increasing amounts of fertilizer, insecticides, machinery and equipment, commercial feeds, capital, and production supplies.

These two majors provide a large number of elective units so that a student may select a specific area of study to obtain either a broad background in agriculture or technical skills in specialized agricultural fields according to his interest and needs.

Interwoven throughout the curricula are general education courses in English, Economics, History, Mathematics, and Political Science which provide the basis for better citizenship and understanding of society.

AGRICULTURAL BUSINESS MANAGEMENT MAJOR

The Agricultural Business Management major prepares students for the many farm-related agricultural businesses and government agencies serving the farmer. Farm-related business functions involving agricultural products provide excellent career opportunities for those who are prepared in the business principles and procedures necessary for organizing, managing and representing the expanding farm-related businesses and industry.

FARM MANAGEMENT MAJOR

The Farm Management major prepares the student to operate and manage a farm or ranch. While the management of a farm should be the primary purpose of most students taking the curriculum, students also may plan to engage in allied work such as farm credit and farm appraisal or in management positions with agricultural enterprises.

CURRICULUM IN AGRICULTURAL BUSINESS MANAGEMENT

Freshman	F	W	S
Introduction to Agribusiness (AM 101).....	3		
Introduction to Agricultural Economics (AM 102).....		3	
Agricultural Business Organization (ABM 103).....			3
Mathematics (Math 113, 114)		3	3
Agricultural Mechanics (AE 121)	2		
Freshman Composition (Engl 104, 105).....	3	3	
Physical Education Activity	1	1	1
* Life Science	4		
** Electives	3	6	9
	16	16	16

* To be selected in accordance with the General Education requirement.

** At least 34 units shall be chosen with the approval of the adviser from other fields of agriculture. Twelve of the 34 units must be in a single agriculture major.

Agricultural Management

Sophomore	F	W	S
Agricultural Business Sales and Service (ABM 201).....	3		
Agricultural Cooperative Organization and Management (ABM 202).....		3	
Agricultural Credit and Finance (AM 310).....			3
Agricultural Business Machines Practice (ABM 241)		1	
Principles of Accounting (Actg 221, 222)	4	4	
Principles of Economics (Ec 211)	3		
Agricultural Economics (AM 212).....		3	
Agricultural Marketing (AM 304).....			3
* Humanities elective	3		
Principles of Speech (Sp 200)	3		
Report Writing (Engl 218)			3
* Life Science.....			4
Elementary Probability and Statistics (Stat 211)		3	
Statistical Methods (Stat 212)			3
** Electives	1	3	1
	<hr/> 17	<hr/> 17	<hr/> 17
Junior			
Agricultural Business Management and Government Policy (ABM 301).....	3		
Agricultural Business Sales Management (ABM 302).....		3	
Agricultural Property Management and Sales (ABM 321)	4		
Advanced Agricultural Business Management (ABM 322, 323)		4	4
Computer Application to Agriculture (AM 250)			2
General Psychology (Psy 202).....		3	
Advanced Public Speaking (Sp 202)			2
General Inorganic Chemistry (Chem 121, 122)	4	4	
Organic Chemistry (Chem 226).....			4
American Government (Pol Sc 201).....	3		
** Electives	3	3	4
	<hr/> 17	<hr/> 17	<hr/> 16
Senior			
Agricultural Labor Relations and Personnel Management (ABM 403).....			3
Agricultural Business Operations Analysis (ABM 421).....	4		
Wholesaling and Retailing Agricultural Commodities (ABM 412)		3	
Agricultural Business Communication (ABM 402).....		3	
Senior Project (ABM 461, 462).....	2	2	
Undergraduate Seminar (ABM 463).....			2
* Literature or Philosophy		3	3
Business Law Survey (Bus 201)	3		
Growth of American Democracy (Hist 204).....	3		
U.S. in World Affairs (Hist 205).....			3
** Electives	5	5	5
	<hr/> 17	<hr/> 16	<hr/> 16

* To be selected in accordance with the General Education requirement.

** At least 34 units shall be chosen with the approval of the adviser from other fields of agriculture. Six of the 34 units must be 300 or 400 level courses.

Agricultural Management

CURRICULUM IN FARM MANAGEMENT

	F	W	S
Freshman			
Introduction to Agribusiness (AM 101).....	3		
Introduction to Agricultural Economics (AM 102).....		3	
Agricultural Cooperative Organization (ABM 202).....			3
Mathematics (Math 113, 114).....		3	3
Freshman Composition (Engl 104, 105).....	3	3	
Principles of Speech (Sp 200).....			3
Physical Education Activity.....	1	1	1
Agricultural Business Machines (ABM 241).....	1		
** Life Science.....	4	4	
* Electives.....	4	2	6
	16	16	16
Sophomore			
Computer Application to Agriculture (AM 250).....		2	
Agricultural Economics (AM 212).....		3	
Agricultural Economic Analysis (FM 213).....			3
Agricultural Marketing (AM 304).....			3
Agricultural Resources (FM 305).....		3	
Farm Records (FM 321).....	4		
Soils (SS 121).....	4		
Principles of Economics (Ec 211).....	3		
** Literature, Philosophy.....	3		3
Report Writing (Engl 218).....			3
Basic Accounting (Actg 131, 132).....		3	3
Elementary Probability and Statistics (Stat 211).....	3		
Statistical Methods (Stat 212).....		3	
* Electives.....		3	2
	17	17	17
Junior			
Agricultural Credit and Finance (AM 310).....	3		
Principles of Farm Management (FM 322).....	4		
California Agriculture (FM 325).....		3	
Farm Appraisal (FM 326).....			4
Agricultural Price Analysis (FM 333).....		3	
Crop Management Problems (FM 421).....			3
Agricultural Prices and Policy (FM 403).....	3		
General Psychology (Psy 202).....			3
General Inorganic Chemistry (Chem 121, 122).....	4	4	
Organic Chemistry (Chem 226).....			4
Business Law Survey (Bus 201).....		3	
* Electives.....	3	4	2
	17	17	16
Senior			
Linear Programming in Agriculture (FM 405).....		3	
Farm Management Problems (FM 424, or FM 425, or FM 426).....	3		
Large Farm Accounting (FM 431).....	3		
Senior Project (FM 461, 462).....	2	2	
Undergraduate Seminar (FM 463).....			2
** Humanities elective.....	3		
American Government (Pol Sc 201).....	3		
Growth of American Democracy (Hist 204).....		3	
U.S. in World Affairs (Hist 205).....			3
* Electives.....	3	8	11
	17	16	16

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Agricultural Management, Agricultural Business Management, Farm Management and other subjects.

* At least 36 units shall be chosen with the approval of the adviser from other fields of Agriculture. Nine of the 36 units must be 300 or 400 level courses.

** To be selected in accordance with the General Education requirement.

ANIMAL SCIENCE DEPARTMENT

Department Head, Richard F. Johnson

Russell K. Anderson
Gene A. Armstrong
Richard J. Birkett
Emmett A. Bloom
L. LaVerne Bucy
James R. Flanagan

Frank W. Fox, Jr.
William R. Gibford
Robert E. Hadley
Michael C. Hall
Roy M. Harris
Robert D. Hooks

James W. Jacobs
Lyle G. McNeal
Kenneth C. Scott
John V. Stechman
Robert R. Wheeler

The objective of the Animal Science Department is to educate men for the occupation of farming where beef cattle, sheep, and swine enterprises are an important part of the industry. The majority of graduates from the department are engaged in the livestock and farming business or are employed as ranch foremen or managers. Women students graduating in this major find employment in the field of education and allied services related to the animal industry.

Livestock feeding yards, feed mills, auction sales companies, meat packers, commission firms, and other organizations servicing the livestock industry are sources of employment for graduates. Other employment fields include agricultural teaching, agricultural extension work, agricultural research in the areas of animal nutrition, genetics, and reproductive physiology. The department allows wide latitude in the selection of elective courses so that a student may pursue a secondary emphasis area or broaden the cultural base of his total college education.

The educational approach of the Animal Science Department is to provide students with instruction in theory and application of all phases of livestock production and range management. To this end the department maintains purebred and commercial instructional herds of the chief meat animal species, and broodmare bands of Thoroughbred and Quarter horses. The University herds and flocks are extensively used for laboratory and applied studies of management, feeding, breeding, and marketing techniques and procedures.

The student is encouraged to augment his classroom and laboratory instruction through participation in the varied enterprise programs operated by the California Polytechnic State University Foundation. Through these programs large numbers of student-owned beef cattle, sheep and hogs are fed and marketed each year. Provision is also made to give the students an opportunity to own and manage, in partnership with the Foundation, a commercial cow herd and a prototype range band of ewes.

Instruction in the department also encompasses a diversified co-curricular program including three special interest clubs and the sponsorship of championship-calibre national intercollegiate teams in rodeo, livestock judging, and horse show teams. Students interested in the two-year technical certificates should refer to the introductory statement for the School of Agriculture and Natural Resources which describes this program. Detailed curriculum information is available from the department head.

CURRICULUM IN ANIMAL SCIENCE

Freshman	F	W	S
Feeds and Feeding (ASci 101)	4		
Market Beef Production (ASci 111)		3	
Elements of Swine Production (ASci 112)	3		
Elements of Sheep Production (ASci 113)			3
Agricultural Mechanics (AE 121 or 122)	2		
Freshman Composition (Engl 104)	3		
Report Writing (Engl 218)		3	
Mathematics (Math 102, 114)	3	3	
Physical Education Activity	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
General Zoology (Zoo 131, 132)		4	4
Applied Beef Cattle Management (ASci 241)		2	
Applied Swine Management (ASci 242)	2		
Applied Sheep Management (ASci 243)			2
Library Instruction (Lib 101)			1
Principles of Speech (Sp 200)			3
Electives			3
	17½	15½	16½

Animal Science

Sophomore	F	W	S
† Animal Science electives	4	3	
Agricultural Engineering electives	2	2	
Anatomy and Physiology (VS 123)		3	
Soil Science (SS 121)			4
General Inorganic Chemistry (Chem 121, 122)	4	4	
Organic Chemistry (Chem 226)			4
General Bacteriology (Bact 221)	4		
Physical Education Activity	½	½	½
General Botany (Bot 121)		4	
Forage Crops (CrSc 123)			4
Meats (Fl 210)			3
Electives	2		2
	16½	16½	17½
Junior			
Applied Animal Nutrition (ASci 302)		3	
Animal Hygiene (VS 302)	3		
Animal Parasitology (VS 203)		3	
† Animal Science electives			4
American Government (Pol Sc 201)	3		
General Psychology (Psy 202)			3
Genetics (Bio 303)		3	
Economics (Ec 201)	3		
Farm Records (FM 321)		4	
Farm Management (FM 322)			4
Biochemistry (Chem 328)			4
Business elective	3		
Electives	4	3	2
	16	16	17
Senior			
Animal Breeding (ASci 304)		3	
Reproductive Physiology (ASci 401)	4		
Animal Nutrition (ASci 402)		4	
Senior Project (ASci 461, 462)	2		2
Undergraduate Seminar (ASci 463)		2	
* Literature, Philosophy	3	3	
* Humanities elective			3
U.S. World Affairs (Hist 205)			3
Growth of American Democracy (Hist 204)	3		
† Animal Science electives	2	1	6
Agricultural Management elective (300-400 level)		3	
Electives	3		2
	17	16	16

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Animal Science and other subjects.

* To be selected in accordance with the General Education requirement.

† 20 units to be selected from courses in ASci, DH, PI. At least 7 units must be at the 300-400 level.

CROP SCIENCE DEPARTMENT

Department Head, Corwin M. Johnson

Charles B. Atlee

Gene P. Offermann

William R. Troutner

H. Paul Fountain

Howard Rhoads

Gordon L. Van De Vanter

George G. Gowgani

Frank P. Thrasher

Ralph M. Vorhies

James T. Hallett

Two major curricula are offered by the Crop Science Department and are designed to prepare students for field, fruit, or vegetable crop production and for employment in related service areas.

Graduates in both Crop Science and Fruit Science have attained responsible positions in agronomic and horticultural production, teaching, research, extension, quality control and inspection, and sales and service areas. Opportunities for employment in private industry and governmental sectors are available for those with practical knowledge of agricultural skills and techniques and a good background in the sciences and humanities.

The Department has 30 acres of productive citrus, grapes, and deciduous orchard with over 100 varieties represented. Additional non-bearing acreage for instructional use exists and new plantings are under way. About 170 acres are devoted to student production enterprises in field and vegetable crops. An additional 500 acres of campus farm cropland provide opportunities to gain experience through part-time employment. All departmental majors are encouraged to gain experience and earn income by participation in the project enterprise program or by working for the campus farm.

The technological phases of instruction are enhanced by packing and grading equipment, seed processing equipment, and specialized laboratory equipment for the study of various crops. Field trips supplement instruction for crops not common to the San Luis Obispo area.

Students interested in the two-year technical certificate should refer to the School of Agriculture and Natural Resources introductory statement. The department head can supply additional information.

CROP SCIENCE MAJOR

A student in the Crop Science major may elect to specialize in Agronomy, Vegetable Science, Plant Protection, or Agricultural Inspection in the junior and senior years. Employment opportunities for the students graduating in the Crop Science major include private or corporate crop production and management, sales and service, positions with commercial pest control firms, government regulatory agencies, as fieldmen for various agricultural and agriculture related organizations, and as agronomists and horticulturists with government or industry.

FRUIT SCIENCE MAJOR

The Fruit Science Major qualifies graduates for orchard or vineyard management or for related employment as fieldmen for packers or canners, fruit inspection, or plant protection. Instruction includes deciduous fruits, nut crops, citrus, avocados, grapes, berries, tropical and sub-tropical fruits, and minor fruit species. Students may elect to specialize in Fruit Science, Plant Protection, or Agricultural Inspection in the junior and senior years.

Crop Science

CURRICULUM IN CROP SCIENCE

Freshman	F	W	S
Concepts of Crop Production (CrSc 131).....	4		
Combine Harvest Crops (CrSc 132).....		4	
Row Crops (CrSc 133).....			4
Agricultural Engineering Elective.....	4		4
General Botany (Bot 121, 122 or 123).....	4	4	
Freshman Composition (Engl 104, 105).....		3	3
*Mathematics (Math 102, 103).....	3	3	
Health Education (PE 250).....	2		
Physical Education Activity.....		$\frac{1}{2}$	$\frac{1}{2}$
Electives.....		2	6
	17	16 $\frac{1}{2}$	17 $\frac{1}{2}$
Sophomore			
Weed Control (CrSc 221).....	4		
Commercial Seed Production and Processing (CrSc 231).....		4	
Vegetable Crops Production (VgSc 232).....			4
General Inorganic Chemistry (Chem 121, 122).....	4	4	
Organic Chemistry (Chem 226).....			4
Soils (SS 121).....	4		
Soil Management (SS 122).....		4	
Fertilizers (SS 221).....			4
Principles of Speech (Sp 200).....			3
General Psychology (Psy 202).....	3		
Economics (Ec 201 or 211).....		3	
Electives.....	2	2	2
	17	17	17
Junior			
General Bacteriology (Bact 221).....	4		
Crop Technology (CrSc 322).....		4	
Farm Records (FM 321).....	4		
††Management Elective.....		4	
Biochemistry (Chem 328).....	4		
California Fruit Growing (FrSc 230).....			4
Plant Pathology (Bot 323).....			4
American Government (Pol Sc 201).....	3		
Growth of American Democracy (Hist 204).....		3	
U.S. in World Affairs (Hist 305).....			3
#Electives.....	2	4	6
	17	15	17
Senior			
Plant Breeding (CrSc 304).....			4
Senior Project (CrSc 461, 462).....	2	2	
Undergraduate Seminar (CrSc 463).....			2
Genetics (Bio 303).....	3		
††Management Elective.....		3	
Applied Insect Pest Management (CrSc 311).....	4		
** Literature, Philosophy.....	3	3	
** Humanities elective.....			3
#Electives.....	4	8	6
	16	16	15

* Math 113 may be substituted for Math 102 and 103 with adviser approval.

** To be selected in accordance with the General Education requirement.

At least 12 units to be selected with the approval of the adviser to complete the major.

†† To be selected from any 300-400 series course in ABM, AM or FM.

CURRICULUM IN FRUIT SCIENCE

Freshman	F	W	S
Pomology (FrSc 131, 132, 133)	4	4	4
*Mathematics (Math 102, 103, 114)	3	3	3
Agricultural Engineering electives	2		4
Freshman Composition (Engl 104, 105)	3	3	
Health Education (PE 250)		2	
General Botany (Bot 121, 122 or 123)	4	4	
Physical Education Activity		$\frac{1}{2}$	$\frac{1}{2}$
Electives			6
	16	16 $\frac{1}{2}$	17 $\frac{1}{2}$
Sophomore			
Viticulture (FrSc 231)	4		
Fruit Plant Propagation (FrSc 232)		4	
General Inorganic Chemistry (Chem 121, 122)	4	4	
Organic Chemistry (Chem 226)			4
Soils (SS 121)	4		
Soil Management (SS 122)		4	
Plant Pathology (Bot 323)			4
Weed Control (CrSc 221)			4
Principles of Speech (Sp 200)	3		
Agricultural Engineering electives	2		
Economics (Ec 201 or 211)		3	
Electives		2	5
	17	17	17
Junior			
Fruit Production (FrSc 331 or 332)		4	
General Bacteriology (Bact 221)		4	
Applied Insect Pest Management (CrSc 311)	4		
Agricultural Code of California (CrSc 303)		3	
Biochemistry (Chem 328)		4	
Genetics (Bio 303)	3		
Fertilizers (SS 221)			4
Farm Records (FM 321)	4		
Principles of Farm Management (FM 322)			4
General Psychology (Psy 202)	3		
Electives	3		9
	17	15	17
Senior			
Advanced Pomology (FrSc 421)	3		
Plant Breeding (CrSc 304)	4		
Senior Project (CrSc 461, 462)	2	2	
Undergraduate Seminar (CrSc 463)			2
Orchard Management (FrSc 436)			4
General Field Crops (CrSc 230)		4	
** Management Elective			3
American Government (Pol Sc 201)	3		
Growth of American Democracy (Hist 204)		3	
U.S. in World Affairs (Hist 205)			3
†† Literature, Philosophy	3	3	
†† Humanities elective			3
Electives	1	4	1
	16	16	16

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Crops Science, Fruit Science, Vegetable Crop Science and other subjects.

* Math 113 may be substituted for Math 102 and 103 with adviser approval.

** To be selected from any 300-400 series course in ABM, AM or FM.

†† To be selected in accordance with the General Education requirement.

DAIRY AND POULTRY SCIENCE DEPARTMENT

Department Head, Harmon B. Toone

Roland Pautz

Carl F. Moy

Herman E. Rickard

Harry G. Markos

Gary D. Reif

Leo Sankoff

The dairy and poultry programs are combined under one department with two options in Dairy Science and a separate curriculum and major in Poultry Industry.

DAIRY SCIENCE MAJOR

The dairy curriculum is designed to prepare students for employment in the various phases of the dairy industry, including husbandry and manufacturing, as well as the related and allied fields. The basic curriculum is arranged to serve all students within the major with further courses included in the two options of husbandry and manufacturing to provide depth of instruction in either field.

The curriculum provides adequate elective units under either option for students to select additional courses in the sciences, business, education, or other areas of their choice to prepare them for advanced degrees in the field, teaching, or the business world of the dairy industry. Recommendations in these various areas will be given by staff advisers.

Excellent facilities are provided for students selecting either of the options. The dairy herd includes purebred Jerseys, Guernseys, and Holsteins, located on a well-planned unit, where feeding, milking, calf raising, artificial insemination, and management are carried out. The campus creamery is a new and modern plant, well equipped with the most modern processing equipment. Students are employed on a part-time basis to work in both the production and processing areas. A separate dairy located on campus provides an opportunity for students with dairy projects. This farm accommodates 80-100 head of project cattle owned and cared for by students. There are two 12-unit dormitories at this project farm.

CURRICULAR OPTIONS

Husbandry

The Dairy Husbandry Option emphasizes the preparation of students in production and management areas of the industry, including the selection, management, feeding and breeding of dairy cattle, and efficient, economical milk production.

Manufacturing

The Dairy Manufacturing Option emphasizes preparation for participation in the processing and distribution field, including sales, quality control, field work and dairy inspection.

POULTRY INDUSTRY MAJOR

The function of the Poultry Industry major is to prepare students for a wide variety of positions in commercial poultry production and in the many allied services related directly to the industry. Opportunities in the industry are many and varied as evidenced by the fact that graduates have worked in more than fifty types of jobs in the industry.

The university has facilities for more than 15,000 birds on 12 acres of land. The plant maintains a commercial productive unit, with seven breeds and varieties of chickens, a turkey flock and a number of species of upland game birds. It has a 17,000 egg hatchery equipped to hatch eggs from quail size to turkeys; poultry dressing plant; egg handling and processing facilities, as well as many types of poultry-raising equipment commonly used in California.

Each poultry student has an opportunity to conduct commercially productive projects in market eggs, hatching eggs, broilers, started pullets and game birds, which gives him additional experiences in the field of business transactions. Advanced students may have opportunities to conduct technical management or developmental problems.

Students interested in the two-year technical certificate should refer to the introductory statement for the School of Agriculture and Natural Resources, which describes this program. Detailed curriculum information is available from the department head.

CURRICULUM IN DAIRY SCIENCE

	F	W	S
Freshman			
Elements of Dairying (DH 121)	4		
Dairy Feeds and Feeding (DH 101)	2		
Feeding Dairy Cattle (DH 102)		2	
Market Milk (DM 133)			4
Freshman Composition (Engl 104, 105)	3	3	
Mathematics (Math 102, 103 or 113, 114)		3	3
General Zoology (Zoo 131)		4	
General Botany (Bot 121)	4		
Health Education (PE 250)			2
Physical Education Activity	$\frac{1}{2}$	$\frac{1}{2}$	
Electives and courses to complete major	4	4	7
	<u>17½</u>	<u>16½</u>	<u>16</u>
Sophomore			
Milk Production (DH 221)	4		
Dairy Products Judging (DM 233)			2
Economics (Ec 201 or 211)		3	
Principles of Speech (Sp 200)			3
* Literature or philosophy	3	3	
* Humanities elective			3
General Bacteriology (Bact 221)	4		
General Psychology (Psy 202)			3
Electives and courses to complete major	6	11	6
	<u>17½</u>	<u>17</u>	<u>17</u>
Junior			
Dairy Inspection (DM 332)			2
Dairy Product Merchandising (DM 202)		2	
General Inorganic Chemistry (Chem 121, 122)	4	4	
Organic Chemistry (Chem 226)			4
Report Writing (Engl 218)			3
American Government (Pol Sc 201)	3		
Electives and courses to complete major	10	10	7
	<u>17</u>	<u>16</u>	<u>16</u>
Senior			
Senior Project (DH 461, 462)	2	2	
Undergraduate Seminar (DH 463)			2
Biochemistry (Chem 328)	4		
Growth of American Democracy (Hist 204)		3	
U.S. in World Affairs (Hist 205)		3	
† Management elective		3	
Electives and courses to complete major	10	8	11
	<u>16</u>	<u>16</u>	<u>16</u>

HUSBANDRY OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)

Freshman	Junior
DH 142 Dairy Cattle Judging..... (2)	DH 301 Advanced Dairy Cattle Feeding..... (2)
SS 121 Soils..... (4)	DH 323 History of Dairy Breeds and Pedigrees..... (4)
	Bio 303 Genetics..... (3)
Sophomore	FM 321 Farm Records..... (4)
DH 222 Commercial Dairy Herd Management..... (4)	
VS 123 Anatomy and Physiology (3)	Senior
VS 302 Animal Hygiene..... (3)	DH 422 Breed and Selection of Dairy Cattle..... (4)
	ASci 402 Animal Nutrition..... (4)
	FM 322 Farm Management..... (4)

* To be selected in accordance with the General Education requirement.

† To be selected from 300-400 series courses in ABM, AM or FM.

Dairy and Poultry Science

MANUFACTURING OPTION (ADD COURSES BELOW TO BASIC CURRICULUM)

Freshman		Junior	
DM 132 Ice Cream Making.....	(4)	DM 331 Condensed and Dry Milk	(4)
		FI 122 Food Processing Machinery	(3)
		Mgt 311 Industrial Management.....	(3)
Sophomore		Senior	
DM 334 Cheese Making	(4)	DM 431 Dairy Plant Management	(4)
DM 236 Butter Making	(4)	Actg 221 Principles of Accounting	(4)
Bact 322 Dairy Bacteriology	(4)	Actg 222 Principles of Accounting	(4)

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Dairy Husbandry, Dairy Manufacturing and other subjects.

CURRICULUM IN POULTRY INDUSTRY

Freshman	F	W	S
Poultry Industry Development (PI 121).....	4		
Replacement Programs & Broiler Production (PI 122).....		4	
Poultry Feeding & Nutrition (PI 123).....			4
Agricultural Mechanics (AE 121, 122).....		2	2
Freshman Composition (Engl 104, 105)	3	3	
Mathematics (Math 102, 103 or 113, 114).....	3	3	
Health Education (PE 250)			2
Physical Education Activity	½	½	
General Zoology (Zoo 131, 132).....	4	4	
General Botany (Bot 121).....			4
Electives	2		5
	<hr/> 16½	<hr/> 16½	<hr/> 17
Sophomore			
Poultry Selection and Egg Production (PI 221)	2		
Poultry Production Processing & Marketing (PI 222).....		3	
Poultry Incubation (PI 223).....			2
Poultry Plant Design & Equipment (PI 233).....			2
Agricultural Engineering or Welding	2		
Poultry Anatomy and Physiology (PI 231).....	3		
Soils (SS 121)			4
Principles of Speech (Sp 200)		3	
Economics (Ec 201 or 211).....	3		
** Humanities elective		3	
General Bacteriology (Bact 221).....	4		
Genetics (Bio 303)		3	
General Psychology (Psy 202).....		3	
** Business Management			3
Electives	3	2	5
	<hr/> 17	<hr/> 17	<hr/> 16

** To be selected in accordance with General Education requirement.

To be selected from Bus 201, FPM 310, IR 118, Mgt 311.

Dairy and Poultry Science

Junior	F	W	S
Applied Poultry Breeding (PI 321)	3		
Hatchery Business Organization (PI 322)		4	
Poultry Hygiene and Flock Health (PI 303)			3
Agricultural Engineering		3	
Farm Records (FM 321)	4		
Principles of Farm Management (FM 322)			4
** Literature, Philosophy	3	3	
American Government (Pol Sc 201)		3	
Growth of American Democracy (Hist 204)			3
General Inorganic Chemistry (Chem 121, 122)	4	4	
Organic Chemistry (Chem 226)			4
Electives	2		2
	16	17	16
Senior			
Advanced Poultry Enterprise Supervision (PI 402)		3	
Turkey Industry (PI 421)	3		
Senior Project (PI 461, 462)	2	2	
Undergraduate Seminar (PI 463)			2
Animal Nutrition (ASci 402)			4
†† Management Elective		3	
U.S. in World Affairs (Hist 205)			3
Biochemistry (Chem 328)		4	
Electives	11	5	7
	16	17	16

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Poultry Industry and other subjects.

** To be selected in accordance with General Education requirement.

†† To be selected from any 300-400 series course in ABM, AM or FM.



FOOD INDUSTRIES DEPARTMENT

Acting Department Head, Thomas M. Lukes

Bruce E. Madden
Thomas O. Meyer

F. Raymond Steele
Robert D. Vance

The Food Industries curriculum is designed to prepare students for employment in the various phases of the food industry. Instruction qualifies students for careers in production, quality control, food technology, marketing, and management.

The curriculum provides applied knowledge of the industry that will enable the graduate to accomplish doing and management jobs connected with operations of the industry from field to market. Skills acquired in the operations aspects of the industry are coordinated with studies in science, business, and humanities.

The departmental laboratories include complete facilities for small scale commercial production of canned, frozen, dehydrated and concentrated fruit and vegetable products. Meats laboratories provide for complete processing of meat including slaughtering, cutting, curing, smoking and sausage manufacture.

Employment opportunities for graduates are excellent.



CURRICULUM IN FOOD INDUSTRIES

Freshman	F	W	S
Survey of Food Industry (FI 101)	2		
Introductory Food Engineering (FI 122)		3	
Elements of Food Preservation (FI 123)			3
Meats (FI 210 or 209)		3	
Freshman Composition (Engl 104)	3		
Report Writing (Engl 218)		3	
Introduction to Literature (Engl 207)			3
Mathematics (Math 114 or 210)	3		
Mathematics elective		3	
Physical Education Activity	1	1	1
General Inorganic Chemistry (Chem 121, 122)		4	4
Physics (Phys 104 or 121)			4
* Electives	6		2
	15	17	17
Sophomore			
Unit Processing Operations (FI 221, 222, 223)	3	3	3
Processed Food Inspection (FI 233)			3
General Bacteriology (Bact 221)			4
Organic Chemistry (Chem 226)	4		
Principles of Speech (Sp 200)	3		
Biochemistry (Chem 328)		4	
Economics (Ec 201 or 211)		3	
American Government (Pol Sc 201)	3		
General Psychology (Psy 202)			3
Industrial Relations (IR 314)		3	
Animal or plant science elective	4	4	
* Electives			3
	17	17	16
Junior			
Food Plant Quality Control (FI 321)	3		
Statistical Quality Control (FI 332)		3	
Packaging (FI 336)			3
Sanitation and Waste Disposal (FI 331)	3		
Food Microbiology (Bact 421)	4		
Growth of American Democracy (Hist 204)		3	
U.S. in World Affairs (Hist 205)			3
Business Management (Mgt 201 or 311 or Mktg 204)	3		
* Electives	4	10	11
	17	16	17
Senior			
Food Processing Management (FI 433)			3
Senior Project (FI 461, 462)	2	2	
Undergraduate Seminar (FI 463)			2
** Literature or Philosophy	3		3
* Electives	12	14	8
	17	16	16

* At least 12 of the elective units must be chosen with adviser's approval.

** To be selected in accordance with the General Education requirement.

NATURAL RESOURCES MANAGEMENT DEPARTMENT

Department Head, Marvin J. Whalls

Anthony E. Knable

R. J. Greffenius

William B. Kurtz

Walter R. Mark

Natural resources are vital to the well-being of the nation. Increasing utilization of natural resources for economic uses and outdoor recreation is reflected in a growing demand for graduates prepared to assume positions of major responsibility. The Natural Resources Management Department prepares students for careers in the management and protection of our natural resources: water, forage, forests, fish and wildlife, wildlands, and recreational lands.

The basic curriculum in natural resources management provides courses in the foundation disciplines of agriculture, humanities, mathematics, and the natural, physical and social sciences. In addition to the basic curriculum, each student of natural resources management is required to complete a block of courses in a field of specialization. Opportunities are available to specialize in conservation education, environmental communications, fisheries and wildlife management, forest resources management, parks and outdoor recreation, or resource law enforcement. Students are awarded the degree of Bachelor of Science upon completion of the program.

Graduates enter employment with federal agencies such as Forest Service, Park Service, and Bureau of Land Management; state agencies such as Natural Resources, Parks and Recreation, and Fish and Game; local agencies such as Park Authorities, Regional Forests and County Parks; and private industry such as lumber companies, utility companies, hunting preserves, and rural recreational enterprises.

The departmental facilities provide opportunity for development of skills necessary for natural resources management. Field practices utilize special campus sites and nearby public and private resource areas.



CURRICULUM IN NATURAL RESOURCES MANAGEMENT

Freshman	F	W	S
Introduction to Natural Resources Management (NRM 101)	3		
Recreation Systems and Management (NRM 112)		3	
Agricultural Surveying (AE 131)			2
Soils (SS 121)			4
General Botany (Bot 121, 123)		4	4
General Zoology (Zoo 131, 132)	4	4	
*Mathematics	3	3	3
Freshman Composition (Engl 104, 105)	3	3	
Report Writing (Engl 218)			3
Health Education (PE 250)	2		
Physical Education Activity	$\frac{1}{2}$	$\frac{1}{2}$	
Sophomore	15 $\frac{1}{2}$	17 $\frac{1}{2}$	16
Resource Planning (NRM 206)	3		
Resource Survey (NRM 223)		3	
Soil Conservation (SS 202)			3
General Ecology (Bio 325)			3
Elementary Probability and Statistics (Stat 211)	3		
General Inorganic Chemistry (Chem 121)		4	
Introductory Physics (Phys 104)			4
Physical Geology (Geol 201)	3		
Physical Geology Laboratory (Geol 241)	1		
Principles of Speech (Sp 200)	3		
Introduction to Literature (Engl 207 or 208)		3	
Safety and First Aid (PE 221)			2
**Electives	4	6	5
Junior	17	16	17
Natural Resources Policy (NRM 302)			3
Resource Law Enforcement (NRM 312)		3	
Ecology of Resource Areas (NRM 323)	3		
Environmental Interpretation (NRM 326)		3	
Aerial Photogrammetry (AE 345)	3		
Physical Geography (Geog 250)	4		
Cultural Anthropology (Ant 201)		3	
American Government (Pol Sc 201)	3		
Growth of American Democracy (Hist 204)		3	
The United States in World Affairs (Hist 205)			3
Humanities (Lit, Art, Drama, or Mu)			3
**Electives	3	5	7
Senior	16	17	16
Applied Resource Economics (NRM 416)		3	
Natural Resources Administration (NRM 438)			4
Senior Project (NRM 461, 462)	2	2	
Undergraduate Seminar (NRM 463)			2
Multiple Use Water Management (AE 328)	4		
Principles of Economics (Ec 211)	3		
Business Law Survey (Bus 201)		3	
Business and Human Relations (IR 415)			3
General Psychology (Psy 202)	3		
Introduction to Philosophy (Phil 101)		3	
**Electives	5	6	7
	17	17	16

See COURSES OF INSTRUCTION section of this catalog for description of courses in Natural Resources Management and other subjects.

* A minimum of 9 units from mathematics, statistics and probability, or computer science must be chosen with approval of the adviser.

** 16 elective units must be chosen with adviser's approval.

ORNAMENTAL HORTICULTURE DEPARTMENT

Department Head, Howard C. Brown

Anthony J. Amato
James A. D'Albro
E. Wesley Conner

Thomas E. Eltzroth
Winton Frey
Timothy A. Gaskin

Robert L. Gordon
Ernest R. Houston

The ornamental horticulture curriculum offers the student a comprehensive preparation for attractive positions in the nursery, greenhouse, landscape, and florist industries. This includes both the production and sales-service areas of these major fields. The training stresses production and marketing of nursery plants, cut flowers, pot plants, and tropical foliage plants, landscape design, planting and supervision, and floral design and marketing.

Graduates of the Ornamental Horticulture Department qualify for management positions in nursery, greenhouse, and florist establishments, as well as supervisory positions in parks and grounds. Many of the graduates enter the field of teaching. Some of the most popular areas of employment include plant propagation, nursery sales, cut flower and pot plant production, greenhouse management, landscape design, landscape contracting and maintenance, the field of advising for fertilizer and pesticide companies, and floral design and floral shop management.

The facilities of the department include a student-operated commercial greenhouse range and nursery in which students carry on a project program involving wholesale and retail sales; and a student-operated florist shop in which the students design and sell floral pieces. Also included are 18,000 square feet of glass-houses, 2,500 square feet of lathhouses, coldframes, seedbeds, and an extensive field-growing and container-growing area. Large, modern, well-equipped laboratories adjoin the greenhouse range. Over 200 acres of landscaped campus area serve as an outdoor laboratory. The campus is planted with many interesting and unusual trees and shrubs from all over the world, as well as a large number of native plant materials.

Also available are the latest models of equipment necessary in nurseries, greenhouses, parks and grounds, landscaping, and florist shops. An extensive list of periodicals covering the field of ornamental horticulture is available to students. Through the staff, affiliation in several national and state horticultural organizations is maintained.

Students interested in the two-year technical certificate should refer to the introductory statement for the School of Agriculture and Natural Resources which describes this program. Detailed curriculum information is available from the department head.

CURRICULUM IN ORNAMENTAL HORTICULTURE

Freshman	F	W	S
Nursery Practice (OH 121).....	4		
Plant Materials I (OH 122).....		4	
Floriculture (OH 123).....			4
Landscape Drafting (OH 124).....	2		
Orientation to Ornamental Horticulture (OH 100).....	1		
Plant Materials II (OH 126).....			4
Agricultural Mechanics (AE 121).....	2		
Landscape Construction (AE 123).....			2
English Composition (Engl 114).....	4		
Report Writing (Engl 218).....		3	
Mathematics (Math 102, 103 or 113, 114).....		3	3
Physical Education Activity.....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
General Botany (Bot 121, 123).....	4	4	
Electives.....		2	2
	<hr/> 17 $\frac{1}{2}$	<hr/> 16 $\frac{1}{2}$	<hr/> 15 $\frac{1}{2}$

Ornamental Horticulture

Sophomore

	F	W	S
Plant Materials III (OH 221)	4		
Principles of Landscape Design (OH 223)		4	
Plant Propagation (OH 233)			4
General Entomology (Ent 126)			4
Soils (SS 121)	4		
Agricultural Surveying (AE 131)		2	
Agricultural Tractors and Equipment Skills (AE 141)			3
Principles of Speech (Sp 200)		3	
Economics (Ec 201 or 211)			3
Physical Education Activity	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
General Psychology (Psy 202)	3		
Plant Pathology (Bot 323)	4		
General Bacteriology (Bact 221)		4	
* Electives	1	3	2
	<u>16½</u>	<u>16½</u>	<u>16½</u>

Junior

Fertilizers (SS 221)		4	
Basic Accounting (Actg 131, 132)	3	3	
American Government (Pol Sc 201)			3
General Inorganic Chemistry (Chem 121, 122)	4	4	
Organic Chemistry (Chem 226)			4
Business Law Survey (Bus 201)			3
Approved science elective	3		
* Electives	7	6	6
	<u>17</u>	<u>17</u>	<u>16</u>

Senior

Diseases and Pests (OH 327)	4		
Native Plant Materials (Bot 238)			3
Senior Project (OH 461, 462)	2	2	
Undergraduate Seminar (OH 463)			2
** Management elective			3
§§ Literature, Philosophy	3	3	
§§ Humanities elective			3
Growth of American Democracy (Hist 204)		3	
U.S. in World Affairs (Hist 205)			3
Crop Science elective (300-400 level)		4	
Approved science elective	4		
Electives	4	4	2
	<u>17</u>	<u>16</u>	<u>16</u>

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Ornamental Horticulture and other subjects.

* At least 18 units to be selected with the approval of the adviser.

** To be selected from any 300-400 series courses in ABM, AM or FM.

§§ To be selected in accordance with the General Education requirement.

SOIL SCIENCE DEPARTMENT

Department Head, Curtis Dean Piper

Arnold M. Dean
Bruce A. Dickson

Luther B. Hughes

Royce L. Lambert
Raymond V. Leighty

The curriculum of the Soil Science Department prepares graduates for employment in professional positions encompassing the various fields of agriculture, such as soil conservationists, land appraisers, fertilizer distributors, farm advisers, farm managers, farm operators or agriculture teachers, and highly specialized positions such as those of soil surveyors, laboratory technicians, college instructors, and soil specialists.

Facilities of the department have been developed to provide laboratory and glass-house space and equipment to emphasize the utilization of classroom knowledge in a practical work situation. The use of demonstration plots and the application of accepted cultural practices on the college farm are among the methods utilized to bridge the gap between the classroom and working experiences.

Students who elect to major in soil science have the opportunity to study in the foundation disciplines of agriculture, humanities and science. The students who select courses in soil science as electives will obtain an essential understanding of the important relationship between man and the soil in regard to meeting the demands for a higher productive capacity for food and fiber.

Students interested in the two-year technical certificate should refer to the introductory statement of the School of Agriculture and Natural Resources which describes the program. Detailed curriculum information is available from the department head.

CURRICULUM IN SOIL SCIENCE

Freshman	F	W	S
Soils (SS 121)	4		
Soil Management (SS 122)		4	
Soil Materials (SS 123)			3
Crop Science elective	4		
Animal Production (ASci 230 or DH 230 or PI 230)			4
Agricultural Surveying (AE 131)			2
General Inorganic Chemistry (Chem 121)			4
Freshman Composition (Engl 104, 105 or 218)	3	3	
§ Mathematics		3	3
General Botany (Bot 121, 122 or 123)	4	4	
Health Education (PE 250)		2	
Physical Education Activity	$\frac{1}{2}$		$\frac{1}{2}$
	15½	16	16½
Sophomore			
Soil Conservation (SS 202)		3	
Fertilizers (SS 221)	4		
Fruit Science elective	4		
Ornamental Horticulture elective			3
Irrigation (AE 340)			4
Introduction to Natural Resources (NRM 101)		3	
§ Mathematics	3		
General Inorganic Chemistry (Chem 122)	4		
Organic Chemistry (Chem 226)		4	
Economics (Ec 201 or 211)	3		
American Government (Pol Sc 201)		3	
Growth of American Democracy (Hist 204)			3
Physics (Phys 104 or 121)		4	
Approved conservation course			3
Electives			3
	18	17	16

§ A minimum of 9 units shall be chosen with the approval of the adviser from 100 or 200 series courses in mathematics.

Veterinary Science

Junior	F	W	S
Soil Classification (SS 321)	4		
Soil Fertility (SS 322)		3	
Land Use Planning (SS 433)			3
Farm Records (FM 321) or Basic Accounting (Actg 131)	4		
† Management elective			3
Biochemistry (Chem 328)	4		
General Bacteriology (Bact 221)		4	
General Entomology (Ent 126) or Insect Control (CrSc 311) ..	4		
U.S. in World Affairs (Hist 205)		3	
Principles of Speech (Sp 200)		3	
Introduction to Literature (Engl 207)		3	
Experimental Techniques and Analysis (CrSc 411)			4
Approved Science or Mathematics			3
Electives	1	1	4
	17	17	17
Senior			
Soil Microbiology (SS 422)		3	
Soil Chemistry (SS 423)			3
Soil Physics (SS 432)	4		
Senior Project (SS 461, 462)	2	2	
Undergraduate Seminar (SS 463)			2
** Approved Social Sciences Course		3	
Introduction to Philosophy (Phil 101)			3
Plant Physiology or Pathology (Bot 322 or 323)		4	
** Humanities elective	3		
† Management elective	3		
Electives	4	5	7
	16	17	15

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Soil Science and other subjects.

VETERINARY SCIENCE DEPARTMENT

Department Head, Wallace F. Glidden
Merton D. Fetters

The Veterinary Science Department offers service courses in basic veterinary science for the animal science departments within the School of Agriculture and Natural Resources. Veterinary science courses are open for elective credit to students who have completed the required prerequisites. A limited number of courses are offered in animal care and meat inspection to prepare students for paramedical and inspection careers within the veterinary profession.

Consultative services are offered by the department to students pursuing pre-veterinary training as a complement to their major field of study. The department also provides clinical services for the campus livestock herds and meat inspection service for the meats laboratory.

** To be selected in accordance with the General Education requirement.

† To be selected from any 300-400 series course in ABM, AM, FM, or Bus. Adm.



SCHOOL OF ARCHITECTURE AND ENVIRONMENTAL DESIGN



SCHOOL OF ARCHITECTURE AND ENVIRONMENTAL DESIGN

George J. Hasslein, FAIA, Dean
Associate Dean, J. Handel Evans

Directors

William H. Brown
Paul R. Neel

William R. Phillips
Kenneth E. Schwartz

Joseph C. Amanzio
Robert F. Asbury, Jr.
James R. Bagnall
Ronald E. Batterson
George M. Baumgarten
Robert O. Beauchamp
Howard Scott Berglund
David A. Brodie
John P. Cutler
Albert W. Draves
John W. Edmisten
Otto Ehrenburg
J. Handel Evans
Jacob Feldman
Donald P. Grant
R. L. Graves, Jr.
Kenneth L. Haggard
John E. Harrigan, Jr.

Raymond J. Hauser
Anatol Helman
Francis H. Hendricks
Carl C. F. Hsieh
George K. Ikenoyama
Thomas V. Johnston
Donald J. Koberg
Joseph M. Kourakis
Hans L. Mager
Michael E. McDougall
Willard L. McGonagill
Ronald R. Morgan
Dell O. Nickell
Raymond E. Nordquist
Ameen I. Noshay
Steven C. Orlick
Jens G. Pohl
Benjamin K. Polk

Charles W. Quinlan
Robert G. Reynolds
Satwant S. Rihal
Elpidio Rocha
David R. Saveker
Helmut L. Schleicher
John S. Stuart
Vern Swansen
Sudhakar G. Thakurdesai
Edward J. Ward
Wesley S. Ward
Maurice L. Wilks
Robert E. Williams
Philip Francis Winninghoff
Carleton M. Winslow
Paul Wolff
K. Richard Zweifel

The School of Architecture and Environmental Design offers five interacting bachelor of science degree programs: Architecture, Architectural Engineering, City and Regional Planning, Construction Engineering, and Landscape Architecture. The student is kept aware that these programs have a common objective and that they are all aimed at the betterment of man's physical environment. These programs endeavor to give the student a set of social values, a technical background, and a training which releases his creative faculties in a way which will make him effective in his profession and as a person.

The first two years of all five programs contain much common material and develop basic skills and background. A decision as to which program the student will pursue need not be made until the beginning of the junior year providing the basic curriculum for the first two years is followed without the substitutions indicated.

A graduate program leading to the Master of Science in Architecture is also offered. This program is designed for the person who seeks registration as a licensed professional architect.

The excellent School facilities include design laboratories, dark rooms, soils laboratory, stress laboratory, shops, construction yard, project yard and grading galleries. An outlying area of 12 acres known as the "Canyon" is available for extensive experimental construction. The location of the campus between the great population centers of San Francisco and Los Angeles is ideal for an architectural school in that it permits concentration and provides for environmental studies ranging from rural to large metropolitan complexes. There is a continual stream of visiting instructors. Field trips are arranged to various parts of the State as required work.

The School is a Member of the Association of Collegiate Schools of Architecture and maintains a Student Chapter of the American Institute of Architects and Scarab, the professional architectural fraternity. Likewise, student chapters of the American Institute of Planners, the Engineering Grading Contractors Association, and the Construction Specification Institute are active and maintain liaison between the respective professional organizations and the School.

All student work submitted for course credit becomes School property and will be returned only at the discretion of the instructor.

Recommended Preparation

The prospective transfer student should prepare himself by taking equivalent Mathematics, Physics and other General Education courses. Wherever possible, he should endeavor to include in his preparation as much as possible of the following 24 semester units of introductory architectural courses: Perspective 2, Freehand Drawing 1, Architectural Delineation 3, Architectural Design 10, Materials of Construction 2, Architectural Drafting 6.

BASIC CURRICULUM FOR ARCHITECTURE, ARCHITECTURAL ENGINEERING AND CONSTRUCTION ENGINEERING

The first two years of the Architecture, Architectural Engineering, and Construction Engineering curriculums have been designed to introduce the student to material which is basic to all these disciplines.

The student who is unsure of his degree objective may postpone his final decision until the end of his second year by judicious selection of courses prerequisite for third year standing in each particular major. The programs in City and Regional Planning and Landscape also contain much in common with the Basic Curriculum and it is possible for these students to delay their choice of major by a judicious selection of course work. Students should consult with their advisors in maintaining programs of study which will keep their options flexible.

Freshman	F	W	S
Intro to Architecture and Environmental Design (EDes 101)	2		
Descriptive Drawing (EDes 110)	1		
Introduction to Drawing and Perspective (EDes 111)		3	
Basic Graphic (EDes 112)			3
Materials of Construction (Arch 106)			3
Analytical Geometry and Calculus (Math 141, 142, 143)	4	4	4
General Physics (Phys 131, 132)		4	4
Engineering Surveying (AE 237)	2		
Freshman Composition (Engl 104)	3		
Written or Oral Communication		3	
General Psychology (Psy 202)	3		
American Government (Pol Sc 201)	3		
Growth of American Democracy (Hist 204)		3	
U.S. in World Affairs (Hist 205)			3
Physical Education Activity	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
	<hr/> 18 $\frac{1}{2}$	<hr/> 17 $\frac{1}{2}$	<hr/> 17 $\frac{1}{2}$
Sophomore	F	W	S
Environmental Design Fundamentals (EDes 201, 202, 203)	4	4	4
Digital Computer Applications (EDes 250)			2
Architectural Practice (Arch 231, 232)		3	3
Strength of Materials (ArcE 205, 206)	3	3	
Stress Analysis (ArcE 304)			3
Introduction to Urban Environment (CRP 211, 212)	3	3	
General Physics (Phys 133 or 137)	4		
Survey of Economics (Ec 201)	3		
* Philosophy		3	
* Life Science elective			3
* Literature			3
Physical Education Activity	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
	<hr/> 17 $\frac{1}{2}$	<hr/> 16 $\frac{1}{2}$	<hr/> 18 $\frac{1}{2}$

* To be selected in accordance with the General Education requirements.

Architecture

CURRICULUM IN ARCHITECTURE

The four-year program in Architecture leads to a Bachelor of Science degree. Emphasis is placed on the development of design and related technical skills necessary as a base for entry into a broad range of environmental design disciplines. As these skills are related to the solving of problems involving people, the designer is also required to develop an understanding and sensitivity to human needs. The B.S. in Architecture degree or an equivalent program is prerequisite for acceptance into the Master of Science in Architecture program, which in turn leads to professional registration as an architect.

Junior	F	W	S
History of Architecture (Arch 317, 318, 319)	3	3	3
Architectural Practice (Arch 341, 342, 343)	2	2	2
Architectural Design (Arch 351, 352, 353)	4	5	5
Building Structural Systems (ArcE 305)	3		
Stress Analysis Laboratory (ArcE 344)	1		
Steel and Timber Structures (ArcE 401)			5
Reinforced Concrete and Masonry Structures (ArcE 406) ..		3	
* Social Science elective	3		
* Humanities elective		3	
	16	16	15
Senior	F	W	S
Senior Project (Arch 461, 462)	2	2	
Undergraduate Seminar (EDES 463)			2
Architectural Practice (Arch 441, 442, 443)	2	2	2
Architectural Design (Arch 451)	5	5	5
Approved technical electives	3	3	3
Electives	3	3	3
	15	15	15

CURRICULUM IN ARCHITECTURAL ENGINEERING

The four year program in Architectural Engineering leads to the Bachelor of Science degree and has its major emphasis in the structural engineering of buildings. The curriculum is creative in purpose with aptitudes in science and mathematics recommended. Students of architectural engineering are educated with architects in a way to give their work the same dedication. Graduates of this program will in general seek professional registration as civil and structural engineers.

Junior	F	W	S
Building Structural Systems (ArcE 305)	3		
Stress Analysis Laboratory (ArcE 344)	1		
Design Analysis for Engineers (ArcE 361, 362, 363)	4	4	4
Steel & Timber Structures (ArcE 401)		5	
Soil Mechanics and Foundations (ArcE 421)			3
Analytical Geometry & Calculus (Math 241)	4		
Differential Equations (Math 242)		4	
Numerical Linear Analysis (CSc 331)			3
Physical Geology (Geol 201)	3		
General Chemistry (Chem 124)		4	
Mechanical and Electrical Systems (Engr 311)			3
Electives	3		3
	18	17	16

* To be selected in accordance with the General Education requirements.

Architecture

Senior	F	W	S
Senior Project (ArcE 461, 462).....	2	2	
Undergraduate Seminar (EDes 463).....			2
Matrix Analysis of Structures (ArcE 411).....	3		
Dynamics of Framed Structures (ArcE 412).....		3	
Design Analysis for Engineers (ArcE 431, 432, 433).....	2	2	2
Structural Design (ArcE 444, 445, 446).....	5	5	5
Advanced Materials Test Lab (ArcE 481).....			2
Seismic Analysis (ArcE 482).....			3
Mechanical and Electrical Systems (Engr 312).....	3		
* Humanities elective		3	
Approved technical electives	3	3	
Elective			3
	<hr/> 18	<hr/> 18	<hr/> 17

CURRICULUM IN CONSTRUCTION ENGINEERING

The four year program in Construction Engineering leads to the Bachelor of Science Degree. Major emphasis is placed on engineering, organizing and managing the construction phase of man's efforts to improve his environment. The Construction Engineer is an important member of the building team and requires a professional knowledge of techniques, materials, equipment, job planning and cost control to add to the contributions of the planning and design professions. Graduates of this program can help supply the urgent needs of the construction industry and its related fields.

Junior	F	W	S
Building Structural Systems (ArcE 305).....	3		
Stress Analysis Laboratory (ArcE 344).....	1		
Steel and Timber Structures (ArcE 401).....			5
Reinforced Concrete and Masonry Structures (ArcE 406).....		3	
Construction Practice (ConE 341, 342, 343).....	3	3	3
Mathematics of Matrices (Math 204).....			3
Mathematics of Statistics (Stat 321, 322).....	3	3	
General Chemistry (Chem 124).....			4
Mechanical and Electrical Systems (Engr 311, 312).....	3	3	
Business Law Survey (Bus 201).....		3	
Principles of Management (Mgt 201).....		3	
Managerial Accounting (Actg 301)	4		
* Humanities elective			3
	<hr/> 17	<hr/> 18	<hr/> 18
Senior	F	W	S
Senior Project (ConE 461, 462)	2	2	
Undergraduate Seminar (EDes 463).....			2
Soil Mechanics & Foundations (ArcE 421).....		3	
Construction Practice (ConE 441, 442, 443).....	2	2	2
Construction Engineering Laboratory (ConE 451, 452, 453).....	5	5	5
Physical Geology (Geol 201).....	3		
Approved technical electives	3	3	3
Electives	3	3	3
	<hr/> 18	<hr/> 18	<hr/> 15

* To be selected in accordance with the General Education requirements.

Architecture

CURRICULUM IN CITY AND REGIONAL PLANNING

The four year curriculum leading to a Bachelor of Science degree in City and Regional Planning is directed to the professional field which guides and designs the communities wherein we live. Inasmuch as the education of the student of planning is associated with that of the architect and the engineer, the program has an additional emphasis on design of the physical environment as well as on the process of planning. Concern with the activities of people and their values is essential.

Freshman	F	W	S
Intro to Architecture & Environmental Design (EDes 101).....	2		
Descriptive Drawing (EDes 110).....	1		
Introduction to Drawing & Perspective (EDes 111).....		3	
Basic Graphics (EDes 112).....			3
General Biology (Bio 101).....	3		
* Natural science elective.....		3	
Physical Geology (Geol 201).....			3
Finite Math for Gen Education (Math 110).....	3		
Mathematics of Matrices (Math 204).....		3	
Elementary Probability and Statistics (Stat 211).....			3
Freshman Composition (Engl 104).....	3		
* Written or Oral Communication.....		3	
Report Writing (Engl 218).....			3
American Government (PolSc 201).....	3		
Growth of American Democracy (Hist 204).....		3	
U.S. in World Affairs (Hist 205).....			3
General Psychology (Psy 202).....	3		
Survey of Economics (Ec 201).....			3
Physical Education Activity.....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
	18 $\frac{1}{2}$	15 $\frac{1}{2}$	18 $\frac{1}{2}$
Sophomore	F	W	S
Environmental Design Fundamentals (EDes 201, 202, 203).....	4	4	4
Introduction to Urban Environment (CRP 211, 212).....	3	3	
Data Analysis (CRP 215).....			3
Human Ecology (Bio 301).....	3		
Introduction to Conservation (Cons 311).....		3	
* Literature elective.....			3
Statistical Methods (Stat 212).....	3		
American Constitutional Law (PolSc 321).....		3	
Principles of Sociology (Soc 201).....			3
Data Processing (CSc 100).....	2		
Economics.....			3
Aerial Photogrammetry (AE 345).....	3		
* Philosophy.....		3	
Physical Education Activity.....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
	18 $\frac{1}{2}$	16 $\frac{1}{2}$	16 $\frac{1}{2}$
Junior	F	W	S
Planning Theory (CRP 301, 302).....	2	2	
Planning Lab (CRP 351, 352, 353).....	4	4	4
Design for Planners (Arch 347, 348, 349).....	3	3	3
Urban Sociology (Soc 313).....	3		
Social Psychology (Psy 401).....		3	
Municipal Government (PolSc 403).....	3		
* Humanities elective.....		3	
** Approved electives.....			6
Electives.....			3
	15	15	16

* To be selected in accordance with the General Education requirements.

** To be selected with adviser approval.

Architecture

Senior	F	W	S
Senior Project (CRP 461, 462)	2	2	
Undergraduate Seminar (EDes 463)			2
Planning Theory (CRP 401, 402)	2	2	
Planning Laboratory (CRP 451, 452, 453)	4	4	4
**Approved electives	6	6	6
Electives	2	2	4
	<hr/> 16	<hr/> 16	<hr/> 16

CURRICULUM IN LANDSCAPE ARCHITECTURE

The preparation of professionally qualified people with skills in enhancing man's physical environment is the objective of this program, which leads to a Bachelor of Science degree in Landscape Architecture. Emphasis is placed on the design and functional organization of open space and the conservation and revitalization of both the natural and urban landscapes at scales ranging from domestic units to systems of urban, rural and regional land use. The program will prepare landscape architects to work with architects, engineers and planners in the design of a diversity of functional spaces for human use and enjoyment.

Freshman	F	W	S
Intro to Architecture and Environmental Design (EDes 101)	2		
Descriptive Drawing (EDes 110)	1		
Introduction to Drawing and Perspective (EDes 111)		3	
Basic Graphics (EDes 112)			3
Materials of Construction (Arch 106)			3
Finite Math for Gen Education (Math 110)	3		
Finite Math for Business (Math 210)		3	
Structure and Behavior of Matter (PSc 101, 102)		4	4
General Biology (Bio 101)	3		
Physical Geology (Geol 201)			3
Freshman Composition (Engl 104)	3		
Written or Oral Communication		3	
General Psychology (Psy 202)	3		
Engineering Surveying (AE 237)			2
American Government (PolSc 201)	3		
Growth of American Democracy (Hist 204)		3	
U.S. in World Affairs (Hist 205)			3
Physical Education Activity	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
	<hr/> 18½	<hr/> 16½	<hr/> 18½
Sophomore	F	W	S
Environmental Design Fundamentals (EDes 201, 202, 203)	4	4	4
Digital Computer Applications (EDes 250)			2
Introduction to Urban Environment (CRP 211, 212)	3	3	
Structures and Behavior of Matter (PSc 103)	4		
Survey of Economics (Ec 201)	3		
*Philosophy		3	
*Humanities Elective			3
*Literature Elective			3
Human Ecology (Bio 301)	3		
Introduction to Conservation (Cons 311)		3	
Ornamental Gardening (OH 230)			3
Physical Education Activity	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Electives		3	3
	<hr/> 17½	<hr/> 16½	<hr/> 18½

* To be selected in accordance with the General Education requirements.

** To be selected with adviser approval.

Architecture

Junior	F	W	S
Landscape Practice (LA 341, 342, 343)	2	2	2
Design for Landscape Architecture (LA 351, 352, 353)	5	5	5
History of Landscape Architecture (LA 317)	3		
Landscape Plants (OH 431, 432, 433)	3	3	3
Irrigation, Drainage and Grading Practices (AE 337)			3
Introduction to Sociology (Soc 105)	3		
Urban Sociology (Soc 313)		3	
Business Law Survey (Bus 201)		3	
Electives			3
	16	16	16
Senior	F	W	S
Senior Project (LA 461, 462)	2	2	
Undergraduate Seminar (EDes 463)			2
Design for Landscape Architecture (LA 451, 452, 453)	5	5	5
Implementation of Landscape Design (OH 451, 452, 453)	2	2	2
Approved technical electives	3	3	3
Electives	3	3	2
	15	15	14

CURRICULUM FOR THE MASTER OF SCIENCE IN ARCHITECTURE DEGREE

(For University requirements see *Graduate Study Bulletin*)

Required:	Units
Arch 599 Thesis Project	9
Arch 571, 572, 573 Design Project	6
Arch 551, 561 Architectural Design	25
Courses at 400 and 500 level in the School of Architecture and Environmental Design, not more than one course at 400 level	25
Approved electives outside School of Architecture and Environmental Design at 300, or 500 level	15
Free electives at 300, 400 or 500 level	10
	90

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Architecture, Architectural Engineering, City and Regional Planning, Construction Engineering, Environmental Design, Landscape Architecture, and other subjects.



SCHOOL OF BUSINESS AND SOCIAL SCIENCES



SCHOOL OF BUSINESS AND SOCIAL SCIENCES

Owen L. Servatius, Acting Dean

Harold R. Miller, Associate Dean

The School of Business and Social Sciences has two primary objectives: Education in the specific fields of Business Administration, Economics, Political Science, and Social Sciences, and service to all schools of the University. This School, in providing that service, offers courses satisfying general education requirements that support major degree work throughout the campus.

The School is organized in four departments and its broad objectives are in concert with the objectives of the University, which are to prepare students to meet the requirements of specific occupations and to help the individual to achieve maximum personal development. Specialized instruction in the school also prepares the student for citizenship, leadership, and constructive community living. Faculty members within this school are selected on the basis of academic qualifications and professional experience coupled with outstanding teaching ability.

Guiding all who work within the framework of this School is the ultimate objective of placing our graduates in responsible positions in both the private and public sector of our economy or in fields requiring further graduate education.

The following degrees are offered:

B.S.—Business Administration

B.S.—Economics

B.A.—Political Science

B.S.—Social Sciences

M.B.A.—Master of Business Administration

Choices of occupational concentrations are available to support the undergraduate majors in diverse fields of study.

Students may also concentrate in Social Sciences as part of the requirements for a Master of Arts in Education.

BUSINESS ADMINISTRATION DEPARTMENT

Department Head, Owen L. Servatius

Roy E. Anderson
Charles T. Andrews
Richard D. Babcock
Lawrence E. Baur
William M. Boyce
Wallace H. Burt
Paul R. Cone
Paul L. Dempsey
Milton Drandell

Geraldine B. Ellerbrock
Olaf F. Isachsen
Paul Kenyon
James B. Lau
John R. Lindvall
Weston A. McCormac
Ernest C. Miller
Harold R. Miller
Eugene L. O'Connor

Gordon J. Paul
Rol W. Rider, Jr.
J. Weldon Rohner
Leonard R. Seaman
Robert P. Vartan
Robert F. Williams
Victor F. Wolcott
Paul Zivkovich

The Department offers an undergraduate program leading to the Bachelor of Science Degree in Business Administration with several concentrations available. A graduate program leading to a Master of Business Administration degree is offered to students from diverse undergraduate disciplines.

The undergraduate program prepares students for employment in the administrative and technical functions of business, labor unions, and governmental agencies. It combines courses in general education and a core of business subjects with a concentration in a specialized field in business. Ample opportunity for the student to enhance his educational experience is provided through elective courses available in all of the schools.

The objective of the graduate program is to provide a comprehensive and flexible program of study for graduates from diversified academic backgrounds which will lay the professional foundation for careers of growing responsibility in the business community and related fields. The program encompasses a broad integrated approach to problem solving and decision making with opportunity for functional specialization. Requirements for the degree include completion of certain undergraduate courses prior to entry into the four-quarter integrated program of graduate study.

CURRICULAR CONCENTRATIONS

Accounting

The accounting concentration provides training and practice for both public and private accounting areas.

Economics

This concentration stresses economic analysis as it applies to business and governmental decision making. It is designed to afford the student an opportunity to explore economic theory and its application to the American economy and to prepare students for entry positions in business or government, or for graduate studies.

Finance and Property Management

This concentration is designed as a flexible program for the student wishing to pursue opportunities in the fields of finance, insurance and real estate.

Industrial Relations

The two areas of interest within this concentration relate to labor-management relations and personnel management.

Management

This concentration stresses the managerial process and decision making fundamental to all levels and functional areas of the business and industrial enterprise. The management program offers both quantitative and general management emphases to satisfy the individual needs of the student relative to business or academic ambitions.

Management Information Systems

This concentration is designed to prepare students for careers involving the analysis, design, and operation of business information systems within industry and government. It provides training and practice in administrative data processing and in the analysis of managerial information requirements.

Marketing

Marketing includes all the business activities involved in directing the flow of goods and services from the original producer through intermediate processors to the consumer. This concentration emphasizes the management of marketing activities within the firm in coordination with all other activities to accomplish the firm's objective.

CURRICULUM IN BUSINESS ADMINISTRATION

Freshman *	F	W	S
The Business Enterprise (Bus 101).....	4		
Human Relations (IR 118).....			3
English Composition (Eng 114, 115).....	4	4	
Principles of Speech (Sp 200).....			3
**Literature		3	
Physical Education Activity.....	$\frac{1}{2}$	$\frac{1}{2}$	
Health Education (PE 250).....	2		
**Natural Sciences	4	6	5
Finite Mathematics for General Education (Math 110).....	3		
Finite Mathematics for Business (Math 210).....		3	
Calculus for Business and Economics (Math 221).....			4
Data Processing (CSc 100).....			2
	17 $\frac{1}{2}$	16 $\frac{1}{2}$	17

* Unless already acceptable typists, majors will be required to take Bus 141 during their freshman year.

** To be selected in accordance with the General Education requirement.

Business Administration

Sophomore	F	W	S
Principles of Economics (Ec 211, 212, 213).....	3	3	3
Principles of Accounting (Actg 221, 222).....	4	4	
American Democracy and World Affairs (Hist 206).....			5
Economic Geography (Geog 315).....			3
Traditional Logic/Modern Logic (Phil 221 or 222).....			3
Business Data Processing (CSc 140).....	2		
Elementary Probability and Statistics (Stat 211).....	3		
Statistical Methods (Stat 212).....		3	
Business Law (Bus 207).....	4		
General Psychology (Psy 202).....		3	
American Government (Pol Sc 201).....		3	
Electives and courses to complete the major.....	2	1	3
	18	17	17
Junior			
Industrial Relations (IR 314).....			3
Money, Banking and Credit (Ec 337).....	3		
Managerial Accounting (Actg 301).....	4		
Financial Management (FPM 342).....		4	
Marketing Analysis I (Mktg 301).....			4
Operations Management (Mgt 312).....	4		
Corporate Communication (Engl 310).....	3		
Business Applications of Data Processing (Bus 321).....		3	
***Electives and courses to complete major.....	2	8	9
	16	15	16
Senior			
Business and Human Relations (IR 415).....	3		
Business Policies and Organization (Mgt 413, 414).....		3	3
Business Research (Bus 419).....		3	
Senior Project (Bus 460).....			2
Government Regulation of Business (Bus 404).....	4		
**Literature, Philosophy, Art, Drama or Music.....	4		
***Electives and courses to complete major.....	4	10	12
	15	16	17

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Accounting, Business, Business Administration, Finance and Property Management, Industrial Relations, Management, Marketing and other subjects.

** To be selected in accordance with the General Education requirement.

*** 27 of the elective units in the junior and senior years must be chosen with the approval of the adviser in a field of concentration.

CURRICULUM FOR THE MASTER OF BUSINESS ADMINISTRATION DEGREE

(For University requirements see the *Graduate Study Bulletin*)

The following are normally taken as undergraduate electives or requirements prior to acceptance for graduate study:

CSc 100, 140	Data Processing	(2) (2)
Bus 201	Business Law Survey	(3)
Ec 211, 212	Principles of Economics	(3) (3)
Mktg 204	Principles of Marketing	(4)
Math 221 or 141	Calculus	(4)

Integrated Program:

		Units
BA 510	Foundations in Accounting	4
BA 520	Foundations in Finance	2
Math 540	Foundations in Quantitative Methods	4
Stat 540	Foundations in Statistics	3
BA 530	Foundations in Management	3
BA 501	Accounting for Planning and Control	3
BA 508	Marketing Management I	3
BA 527	Quantitative Methods I	3
BA 511	Micro-Economics	3
BA 525	Business Finance	3
BA 513	Operations Management	3
BA 512	Macro-Economics	3
BA 506	Business and Society	3
BA 584	Seminar in Human Resources Management	3
BA 581, 582, 583	Seminar in Applied Decision Making (4, 4, 4)	12
		<hr/> 55

Electives:

Nine units to be selected from the following courses:

BA 500, 509, 518, 522, 528 and one adviser-approved 500 level course	9
	<hr/> 64



ECONOMICS DEPARTMENT

Department Head, Fuad H. Tellew

John P. Adams, Jr.	Timothy W. Kersten	Walter E. Rice
Sara A. Behman	Alfred M. Kretzmann	Howard F. Smith
George M. Eastham	Panagiotis Papakyriazis	R. Elberton Smith
James B. Griffin	Dominic Perello	Daniel P. Williamson

The Economics Department has two broad purposes: it serves all schools of the campus by offering courses which will help students to understand the overall functioning of the American economy; secondly, it offers an undergraduate program leading to the Bachelor of Science Degree in Economics.

The Economics degree program will prepare students for employment in business and government as economists, analysts and general managers. The teaching of economics in high school is another occupational field for the economist. Finally, the program will prepare students to undertake graduate study in economics.

CURRICULAR CONCENTRATIONS

Business and Industrial Economics

The Business and Industrial Economics concentration, designed for those students who intend to seek business and industrial application of the economics discipline, provides a balanced program of economic and business theory and application.

International Trade and Development

This concentration provides a core of trade and development theory, plus study in the ancillary fields of agriculture and anthropology and the application of these fields to particular geographic regions. It is designed for those students interested in working in the international area in the public or private sectors.

Quantitative Economics

This concentration will offer a combination of mathematics, statistics, and quantitative economics courses. As a unit they are designed to provide the graduate with a background adequate for employment in a variety of business and other situations where the economic decision makers rely on the precision of the mathematician's tools, or for entrance to graduate study in such fields as economics, business administration, or operations research.

CURRICULUM IN ECONOMICS

Freshman	F	W	S
Freshman Composition (Engl 104, 105)	3	3	
Fortran Programming (CSc 101)	2		
Finite Mathematics for General Education (Math 110)	3		
Finite Mathematics for Business (Math 210)		3	
Calculus for Business and Economics (Math 221)			4
Health Education (PE 250)		2	
Physical Education Activity	$\frac{1}{2}$		$\frac{1}{2}$
*Natural science	3	3	6
Introduction to Sociology (Soc 105)	3		
*Art, drama, music		3	
Introduction to Literature (Engl 207)			3
Electives	2	4	3
	16 $\frac{1}{2}$	18	16 $\frac{1}{2}$
Sophomore			
Principles of Economics (Ec 211, 212, 213)	3	3	3
Basic Accounting (Actg 131, 132)	3	3	
*Natural science	3		
Approved statistics courses		3	3
Report Writing (Engl 218)			3
Traditional Logic/Modern Logic (Phil 221 or 222)	3		
Cultural Anthropology (Ant 201)		3	
General Psychology (Psy 202)			3
Electives	4	4	4
	16	16	16

* To be selected in accordance with the General Education requirement.

Economics

Junior

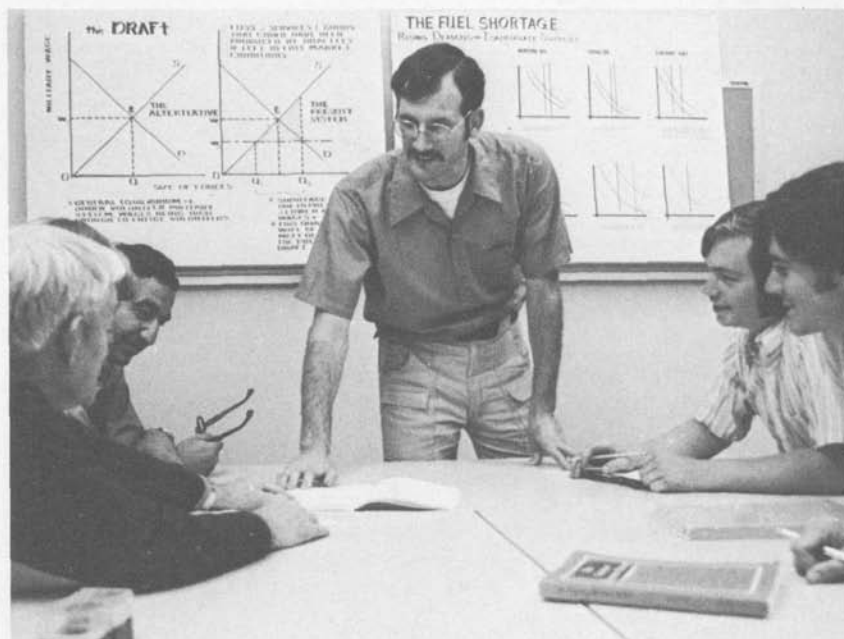
	F	W	S
Intermediate Economic Analysis (Ec 311, 312, 313)	4	4	4
Business Law Survey (Bus 201)	3		
Economic Geography (Geog 315)			3
American Government (Pol Sc 201)	3		
Growth of American Democracy (Hist 204)		3	
U.S. in World Affairs (Hist 205)			3
American Economic History (Ec 324)			3
Money, Banking and Credit (Ec 337)	3		
**Electives and courses to complete major	4	9	4
	17	16	17

Senior

Cost-Benefit Analysis (Ec 410)	3		
Monetary and Fiscal Policies (Ec 414)	4		
Development of Economic Analysis (Ec 317)		3	
Senior Project (Ec 461, 462)	2	2	
Undergraduate Seminar (Ec 463)			2
**Electives and courses to complete major	6	13	14
	15	18	16

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Economics and other subjects.

** 18-28 units to be selected in a field of concentration.



POLITICAL SCIENCE DEPARTMENT

Department Head, William M. Alexander

George G. Clucas
Randal L. Cruikshanks
David L. George
Reginald H. Gooden

Earl D. Huff
Richard B. Kranzdorf
Carl E. Lutrin

Thomas F. Nolan
Allen K. Settle
Joseph N. Weatherby

The Political Science Department offers undergraduate instruction leading to the degree of Bachelor of Arts in Political Science. With a concern for theoretical principles as well as practical application, the degree requirements include both a common body of material and several curricular concentrations as listed below. These concentrations focus the training within the degree program toward career opportunities in government and other public agencies.

In addition to the offerings available for those who wish to major in Political Science, the Department provides students in all curricula within the University with an understanding of the operations of local, state, and national government and the processes by which the individual and community interact in the several levels of government.

Through the required and elective courses, the Department seeks to expand each student's comprehension of the political process, to develop those skills and attitudes which are essential for effective citizenship, and to prepare each Cal Poly graduate for intelligent and responsible political behavior.

CURRICULAR CONCENTRATIONS

Administration

This concentration is designed to prepare students for careers in administrative work in government and related agencies and to prepare students to enter graduate studies in the field of administration.

International Affairs

This concentration is designed to prepare students for careers in government and related agencies which deal in the many problems in international affairs and to prepare students to enter graduate studies in the field of international relations.

Teaching

This concentration is designed to prepare students for careers as elementary school teachers and for careers as social studies teachers in junior high schools and high schools.

Urban Studies

This concentration is designed to prepare students for careers in broad fields of planning within government and related agencies and to prepare students to enter advanced studies in the field of city and regional planning.



CURRICULUM IN POLITICAL SCIENCE

Freshman	F	W	S
Freshman Composition (Engl 114, 115)	4	4	
United States History (Hist 201, 202)		4	4
National and California Government (Pol Sc 101, 102)	3	3	
Introduction to International Relations (Pol Sc 105)			3
Physical Education Activity	½	½	
Health Education (PE 250)	2		
Principles of Speech (Sp 200)			3
Math sciences elective	3		
*Electives and courses to complete major	3	4	5
	15½	15½	15
Sophomore			
Principles of Sociology (Soc 201, 202, 203)	3	3	3
Principles of Economics (Ec 211, 212)	3	3	
General Psychology (Psy 202)			3
Comparative Government (Pol Sc 202)	3		
Basic Political Analysis (Pol Sc 203)		3	
U.S. in World Affairs (Hist 205)		3	
Basic Concepts of Political Thought (Pol Sc 204)			3
*Electives and courses to complete major	7	4	6
	16	16	15
Junior			
American Political Process (Pol Sc 302)	3		
Modern Political Thought (Pol Sc 306)		3	
International Politics (Pol Sc 312)			3
Public Administration (Pol Sc 314, 315, 316)	3	3	3
Biological sciences electives	3	3	3
*Electives and courses to complete major	7	6	6
	16	15	15
Senior			
American Constitutional Law (Pol Sc 321)	3		
Legislative Process (Pol Sc 335)		3	
State and Local Government (Pol Sc 401)		3	
Senior Project (Pol Sc 461, 462)	2	2	
Undergraduate Seminar (Pol Sc 463)			2
Natural sciences elective	3		
Literature elective			3
Philosophy elective			3
Humanities elective	3		
Physical sciences elective		3	
*Electives and courses to complete major	5	5	7
	16	16	15

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Political Science and other subjects.

* 27 of the elective units must be chosen in a field of concentration and must be at the 300-400 level. Concentration lists available at the departmental office.

SOCIAL SCIENCES DEPARTMENT

Department Head, Mahmud S. Hariri

Irving P. Babow
Malcolm J. Carr
Barbara E. Cook
Warren W. DeLey
Anne C. Fowler

David R. Harrow
Robert L. Hoover
Ronald L. LaPorte
John A. McKinstry
Robert E. Norris

Michael J. O'Leary
Leo W. Pinard II
George J. Suchend
Calvin H. Wilvert

The Social Sciences Department serves all of the schools of the campus in providing general education for citizenship. In general, the department seeks to provide the student with a better understanding of the society in which he lives, to develop in the student those skills and attitudes which are prerequisites for effective citizenship, and to prepare and encourage the individual toward intelligent and responsible social action.

The occupational objectives of the department are to train students for those numerous entry jobs in civil service, business, industry, and social welfare which require a bachelor's degree with a major in the social sciences, and to train those who expect to teach the social studies in elementary or secondary schools.

Students with majors in fields other than the social sciences may select courses which will aid in qualifying them for a variety of civil service positions.

The department offers the degree of Bachelor of Science in Social Sciences. This degree allows the student to choose among four concentrations leading to different careers.

The department also offers graduate courses which permit the student to qualify for a Master of Arts Degree in Education with a concentration in the field of social sciences.

CURRICULAR CONCENTRATIONS

Corrections

This concentration is designed to prepare students for careers in law enforcement, corrections, detention, probation and parole.

Ethnic Studies

This concentration is designed to prepare students for careers in community programs in human relations, in agencies implementing public policies in fair employment, housing, education, health, and welfare, and to prepare students to enter graduate programs in related disciplines.

Social Sciences (Teaching)

With proper selection of electives, this concentration leads to preparation for elementary or secondary teaching on completion of the fifth year. It also provides the student with a broad background for entry positions in business.

Social Services

By providing instruction in the social services area, this concentration prepares students to enter such fields as social work, corrections, probation, or parole.

CURRICULUM IN SOCIAL SCIENCES

Freshman	F	W	S
English Composition (Engl 114, 115)	4	4	
National and California Government (Pol Sc 101, 102)	3	3	
Introduction to International Relations (Pol Sc 105)			3
United States History (Hist 201, 202)		4	4
Human Geography (Geog 150)	4		
Physical Education Activity	½	½	
Health Education (PE 250)			2
Mathematical Sciences elective			3
*Electives and courses to complete major	5	5	4
	<hr/> 16½	<hr/> 16½	<hr/> 16
Sophomore			
Principles of Sociology (Soc 201, 202, 203)	3	3	3
Cultural Anthropology (Ant 201)	3		
World Prehistory (Ant 202)		3	
U.S. in World Affairs (Hist 205)	3		
Principles of Speech (Sp 200)			3
General Psychology (Psy 202)		3	
Biological Sciences electives	3	3	3
Philosophy elective			3
*Electives and courses to complete major	5	5	4
	<hr/> 17	<hr/> 17	<hr/> 16
Junior			
Principles of Economics (Ec 211, 212, 213)	3	3	3
Physical Anthropology (Ant 203)			3
Physical Geography (Geog 250)		4	
Comparative Government (Pol Sc 202)	3		
Political Science at 300-400 level	3		
History at 300-400 level		3	
Geography at 300-400 level			3
Physical Sciences elective		3	
Natural Sciences elective			3
*Electives and courses to complete major	8	4	5
	<hr/> 17	<hr/> 17	<hr/> 17
Senior			
Senior Project (Soc Sc 461, 462)	2	2	
Undergraduate Seminar (Soc Sc 463)			2
Anthropology at 300-400 level		3	
Sociology at 300-400 level	3		3
Economics at 300-400 level		3	
Humanities elective	3		
Literature elective			3
*Electives and courses to complete major	8	8	8
	<hr/> 16	<hr/> 16	<hr/> 16

See COURSES OF INSTRUCTION sections of this catalog for descriptions of courses in Anthropology, Archaeology, Geography, Political Science, Social Science, Sociology and other subjects.

* 27 of the elective units must be chosen with the approval of the adviser in a field of concentration.



SCHOOL OF COMMUNICATIVE ARTS AND HUMANITIES



SCHOOL OF COMMUNICATIVE ARTS AND HUMANITIES

Jon M. Ericson, Dean

Stanislaus J. Dundon, Associate Dean

The School of Communicative Arts and Humanities provides a record of man's experience and potential as a creative, imaginative, and reflective human being. The school seeks to enrich the college experience of each student by helping him to understand himself in the society in which he lives. The school seeks to relate itself to the technological disciplines in a way that will help contribute to the solution of human problems. Accordingly, a wide range of courses is offered to serve every thoughtful man and woman without regard to his specialized professional interest.

Programs leading to the bachelor's degree are offered in English, Graphic Communications, History, Journalism, and Speech Communication. The Master of Arts degree is offered in English. Substantial course offerings are included in the departments of Art, Foreign Languages, Music, and Philosophy. Strong cocurricular programs are found in Art, Drama, Forensics, Journalism, and Music.



ART DEPARTMENT

Department Head, Bernice B. Loughran

Roger S. Bailey
David B. Bodlak
Bernard W. Dusek
Charles W. Jennings

Erna B. Knapp
Pierre C. Rademaker
John B. Rea
Henry Wessels

The art instruction program is intended to prepare students for whatever diverse needs they might encounter in their work in the art field. As a part of the general education program, emphasis is placed on those criteria involved in the aesthetic experience: visual consciousness in seeing one's environment, personal expression, and the necessary control of manipulative processes to achieve the desired results. Since art and design are increasingly relevant to many occupational fields, art courses are frequently required within various majors.

Students enrolled in one of the many teacher education majors may elect a minor in art. The pattern for this program is described in the teacher credential bulletin. Those interested in this program should consult an art instructor and file a card in the Art Department office.

ENGLISH DEPARTMENT

Department Head, Willard M. Pederson

Elizabeth B. Anderson	Gloria Jameson	James J. Peterson
Stanley L. Barr	Starr Jenkins	Eugene G. Prater
Patricia A. Brenner	Mead R. Johnson	David R. Rollings
Marvin D. Brown	Miles B. Johnson	Mona G. Rosenman
Edward A. Cairns	David J. Kann	Habib Sheik
Gordon Curzon	George W. Kastner	James E. Simmons
Max E. Darnielle	Brent H. Keetch	Charles W. Strong
Harold D. Evans	John F. Kerr	Gerald J. Sullivan
Arthur H. Friezschke	Alfred Landwehr	William B. Wahl
David M. Grant	Charles H. Lindamood	Isaac N. Walker
Wilfred M. Green	Robert G. Lint	Michael J. Wenzl
Robert J. Huot	Martin L. Luschei	
Norman L. Jackson	Lachlan P. MacDonald	
	John H. Mott, Sr.	

The English Department serves students in all schools by providing courses which will increase a student's understanding, appreciation, and use of his language, in reading and composition. The department offers a variety of courses which, through close study of the works of acknowledged masters of language usage and through providing opportunities for the student himself to use language with greater accuracy and skill, contribute to the general education of all majors.

The primary occupational objective of the department is the preparation of qualified teachers of English for elementary and secondary schools and for the community colleges. For this purpose the department offers a program leading to the Bachelor of Arts degree in English and a program leading to the Master of Arts degree for English instructors in the junior colleges. To produce teachers well versed in the areas of English commonly taught, the major curricula provide a balanced emphasis in study of the language and in the use of the language in composition and literature. A student majoring in English progresses through four significant steps in his education: first, a study of principles governing language, composition, and literature; second, a study of content illustrating these principles; third, application by the student of principles to content produced by himself and others; fourth, application of both principles and content to problems commonly met in the teaching situation.

For the purpose of assigning students to the appropriate level of training in language communication, a placement test is given. The test measures acceptable proficiency in language communication as revealed in sentence structure, appropriate usage, spelling, and paragraph units.

CURRICULUM IN ENGLISH

Freshman	F	W	S
English Composition (Engl 114, 115).....	4	4	
Introduction to Genres (Engl 204)			4
Principles of Speech (Sp 200).....			3
Physical Education Activity.....	½	½	½
Health Education (PE 250).....	2		
\$Basic Mathematics for General Education (Math 100).....		3	
History of Civilization (Hist 101, 102).....	5	5	
*Natural Science	3	3	3
**Electives	1		5
	15½	15½	15½

* A minimum of 15 units of natural science is required for graduation. (See General Education Requirement). Include one sequence course which meets for three quarters with a minimum of 9 units.

** Satisfactory skill in typing is required for graduation. A student who does not type may satisfy the requirement by electing Bus 141.

§ Students preparing for an Elementary Credential should take Math 327 and 328.

English

Sophomore	F	W	S
Introduction to European Literature (Engl 211)	4		
Advanced Composition (Engl 304, 305)	4	4	
British Literature (Engl 221, 222)		4	4
American Government (Pol Sc 201)	3		
Growth of American Democracy (Hist 204)		3	
U.S. in World Affairs (Hist 205)			3
Physical Education Activity	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
*Natural Science	3	3	
Cultural Anthropology (Ant 201)			3
General Psychology (Psy 202)			3
**Social Sciences (not history)			3
Electives	2	2	
	16 $\frac{1}{2}$	16 $\frac{1}{2}$	16 $\frac{1}{2}$
Junior			
American Literature (Engl 311, 312)	4	4	
Modern English Grammar (Engl 301)	4		
Introduction to Shakespeare (Engl 210)			4
English electives (300-400 series)			4
Techniques of Oral Reading (Sp 305)		3	
Introduction to Philosophy (Phil 101)	3		
**Art, Music, or Drama			3
†Electives	4	8	4
	15	15	15
Senior			
Senior Project (Engl 461)	2		
History of the English Language (Engl 303)			4
English electives (300-400 series)		4	
Significant Writers (Engl 414, 417, or 418)	4	4	4
†Electives	9	7	7
	15	15	15

CURRICULUM FOR THE MASTER OF ARTS DEGREE

(For University requirements see the *Graduate Study Bulletin*)

Required:	Units
Engl 502 Introduction to Critical Analysis	3
Engl 503 Contemporary Language Study	3
Engl 504 Problems in Language	3
Engl 505 Problems in Composition	3
Engl 511 Problems in American Literature	3
Engl 512 Problems in British Literature	3
Engl 590 Graduate Seminar in English	3
Additional units in the Engl 300, 400 and 500 series, selected with advisory committee approval. At least 3 units must be at 500 level	15
Elective units in other departments, selected with advisory committee approval	9
Total Units	45

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in English and other subjects.

* A minimum of 15 units of natural science is required for graduation. (See General Education requirement.) Include one sequence course which meets for three quarters with a minimum of 9 units.

** To be selected in accordance with the General Education requirement.

† At least 11 of the elective units must be at the 300-400 level.

FOREIGN LANGUAGES DEPARTMENT

Department Head, Leonard Olguin

Daniel Najera

Bianca Rosenthal

Verlan H. Stahl

Instruction in foreign languages is offered to prepare the student for specific technical, vocational, literary, and cultural needs at home and overseas. Linguistic principles of language learning and language teaching focus on the understanding and use of the particular language.

French, German (including Scientific German), and Spanish are offered. Opportunity for independent study of other languages is provided through Foreign Language 101, 102, 103. The subject matter and teaching methods used provide a useable, practical knowledge of the language studied.

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in French, German, Foreign Language, and Spanish.



GRAPHIC COMMUNICATIONS DEPARTMENT

Department Head, John B. Wordeman

Herschel L. Apfelberg
James H. Babb
Eugene F. Coleman
Peter R. Delvaglio

Wesley T. Dunn
James R. Hutchinson
Stephen Mott

Philip K. Ruggles
Guy H. Thomas, Jr.
Joseph W. Truex

The Graphic Communications Department offers a four-year curriculum leading to the Bachelor of Science degree. The curriculum is designed to prepare graduates for positions of responsibility in the printing and publishing industry or teaching graphic arts vocations in the high schools and junior colleges.

The program provides courses in general education together with a core of printing technology courses. The student is introduced to all stages of the printing processes during the first two years. An option in a specific field of graphic communications is selected for the junior and senior years. A student who terminates his formal education prior to graduation will have sufficient training to qualify him for employment in the printing and publishing industry. However, the program is not designed to provide vocational education for the printing trade.

The Graphic Communications Department occupies 33,000 square feet of floor space in the modern Graphic Arts Building. Theory is taught in up-to-date classrooms incorporating the latest in teaching aids. Ten modern, well-equipped laboratories of printing equipment provide the student with diverse experience in the practical aspects of the industry.

Students seeking careers in business administration, architecture, journalism or other professions which commonly engage the services of printers or publishers will benefit significantly by enrolling in service courses offered by the department.

CURRICULAR OPTIONS

Computer Graphic Communications

This option is designed for the printing major who wishes a career in communication processing. The option prepares the student for careers in computer typography, estimating, scheduling, production management, quality control, and graphic terminal displays.

Graphic Design

Art-oriented students intending to seek careers in graphic arts design and production should enroll in this option. In addition to course offerings in graphic design, the option is designed to familiarize the student with technical limitations imposed upon the designer by the printing processes.

Printing Education

This option is designed for the student interested in teaching printing in junior and senior high schools. The program requires the student to graduate with a major in printing, an academic minor and selected courses in professional education. Completion of the program requires a fifth year of graduate work. The Standard Teaching Credential with Specialization in Secondary Teaching is granted upon successful completion of this program.

Printing Management

This option is designed as a flexible program for the student interested in pursuing employment as a printing plant manager, planner, quality control specialist, production control specialist, estimator, or printing salesman. The program also prepares the student for employment as a technical representative for manufacturers of graphic arts machinery and products.

CURRICULUM IN GRAPHIC COMMUNICATIONS

Freshman	F	W	S
Introduction to Graphic Communications (Gr C 101)	2		
Graphics (Gr C 104)	3		
Substrates and Ink (Gr C 111)			3
Typography (Gr C 122)		5	
Binding and Finishing (Gr C 123)			3
Image Carriers (Gr C 126)			2
Letterpress (Gr C 132)		2	
English Composition (Engl 114)	4		
Report Writing (Engl 218)			3
* Mathematical sciences	3		
* Natural sciences	4	4	4
Manufacturing processes (MP 127)		2	
General Psychology (Psy 202)			3
Physical Education Activity	½	½	½
Electives		3	
	16½	16½	18½
Sophomore			
Theory of Color (GR C 304)	2		
Introduction to Printing Management (Gr C 204)	2		
Copy Preparation for Reproduction (Gr C 223)		3	
Composing Machines (Gr C 224)	5		
Process Camera (Gr C 227)	3		
Stripping and Platemaking (Gr C 228)		2	
Lithography (Gr C 229)			3
Letterpress (Gr C 233)			3
General Biology (Bio 101)	3		
Principles of Speech (Sp 200)		3	
Traditional Logic (Phil 221)			3
Introduction to Mass Media (Jour 118)	3		
Health Education (PE 250)			2
Data Processing (CSc 100)		2	
* Literature		4	
* Approved art course		3	
* Economics			3
Physical Education Activity	½	½	½
	18½	17½	14½
Junior			
Estimating (Gr C 303)			3
Printing Equipment Maintenance (Gr C 326)			3
Plant Organization and Layout (Gr C 333)			3
Screen Processes (Gr C 357)	3		
** Automated Typesetting (Gr C 301)	5		
American Government (Pol Sc 201)	3		
American Democracy and World Affairs (Hist 206)		5	
Electives and courses to complete major	6	13	5
	17	18	14
Senior			
Printing Management (Gr C 421, 422)	3	3	
Web Printing (Gr C 416)		3	
Graphic Communication Development (Gr C 459)			3
Senior Project (Gr C 461, 462)	2	2	
Undergraduate Seminar (Gr C 463)			2
Electives and courses to complete major	11	8	10
	16	16	15

* To be selected with adviser approval in accordance with the General Education Requirement.

** Satisfactory skill in typing required for this course. A student who does not type may satisfy the requirement by electing Bus 141.

Graphic Communications

COMPUTER GRAPHIC COMMUNICATIONS OPTION

(Add courses below to basic curriculum)

Junior		Senior	
CSc 221 Computer Principles and Programming	(3)	GrC 429 Photo Composition Systems	(3)
CSc 222 Digital Computer Symbolic Programming	(3)	CSc 345 Data Structures	(3)
CSc 306 Programming of Small Computers	(3)	CSc 452 Computer Programming Systems	(3)
CSc 310 Programming Language/One (PL/1)	(3)	CSc 455 Computer Graphics	(3)
IE 214 Production Control	(2)	EL 404 Principles of Digital Computers	(3)
		Mgt 418 Quantitative Methods and Controls in Business	(3)

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Graphic Communications and other subjects.

GRAPHIC DESIGN OPTION (Add courses below to basic Curriculum)

Junior		Senior	
Art 222-3 Design Fundamentals	(6)	Art 431-2-3 Graphic Design	(9)
Art 331-2-3 Applied Design	(9)	Gr C 434 Color Separation	(3)
Gr C 335 Commercial Illustration	(3)	Gr C 441 Applied Printing Tech.	(3)
Gr C 323 Pre-Separated Art for Camera	(3)	Jour 421 Newspaper and Magazine Advertising	(3)

PRINTING EDUCATION OPTION (Add courses below to basic Curriculum)

Junior		Senior	
Jour 221 Basic Photography	(3)	Ed 312 Educational Psychology	(3)
Gr C 334 Commercial Typography	(3)	Ed 421 Audio Visual Instruction: Methods and Materials	(3)
Engl 300 Advanced Composition	(3)	Ed 401 Public Education in American Society	(3)
Gr C 312 Theory of Lithography	(3)	Gr C 329 Reproduction Engineering	(3)
Gr C 307 Purchasing	(2)	Ed 403 Teaching Procedures in the Secondary School	(3)
Gr C 335 Commercial Illustration	(3)	Gr C 336 Advanced Letterpress	(3)
		Gr C 441 Applied Printing Tech.	(3)

PRINTING MANAGEMENT OPTION (Add courses below to basic Curriculum)

Junior		Senior	
Gr C 307 Purchasing	(2)	Gr C 401 Printing Sales	(2)
Gr C 312 Theory of Lithography	(3)	Gr C 408 Newspaper Prod. Mgmt.	(2)
Actg 221-2 Principles of Accounting	(8)	Gr C 411 Estimating and Pricing	(3)
Actg 223 Cost Accounting and Analysis	(4)	Gr C 423 Printing Management	(3)
Bus 201 Business Law Survey	(3)	FPM 342 Financial Management	(4)
Bus 321 Business Applications of Data Processing	(3)	Psy 302 Psychology of Business and Industry	(3)

HISTORY DEPARTMENT

Department Head, Herman C. Voeltz

Timothy M. Barnes
Lloyd N. Beecher
Robert E. Burton
Ralph W. Dilts
James L. Fitts
Richard Griswold

Donald W. Hensel
Daniel E. Krieger
Scott J. Maughan
Edward L. Mayo
Barton C. Olsen
Max E. Riedlsperger

Joseph B. Romney
Victoria Rose
Robert L. Rosenberg
M. Eugene Smith
John G. Snetsinger

The History Department serves all schools of the university by offering general education courses in American democracy and in world affairs. It also provides an undergraduate major in history built on a broad social science base leading to a bachelor of arts degree. The history major provides strong preparation for elementary and secondary teaching and for employment in government and business. A minor in history is available for teaching credential purposes.

CURRICULUM IN HISTORY

Freshman †	F	W	S
History of Civilization (Hist 101, 102).....	5	5	
English Composition (Engl 114, 115).....	4	4	
Physical Education Activity.....	½	½	½
*Natural Science.....	3	3	3
National and California Government (Pol Sc 101, 102).....	3	3	
Introduction to International Relations (Pol Sc 105).....			3
Mathematics for General Education (Math 100).....			3
Health Education (PE 250).....			2
Electives.....			4
	15½	15½	15½
Sophomore			
United States History (Hist 201, 202).....	4	4	
Physical Education Activity.....	½	½	½
*Natural Science.....		3	3
Economics (Ec 211 or 201).....	3		
Principles of Sociology (Soc 201, 202).....	3	3	
Public Speaking (Sp 200, 202).....		3	2
Cultural Anthropology (Ant 201).....			3
General Psychology (Psy 202).....			3
Electives.....	6	3	5
	16½	16½	16½
Junior			
European Historiography (Hist 301).....	3		
American Historiography (Hist 302).....		3	
U.S. in World Affairs (Hist 205).....			3
U.S. History at 400 level.....	4	4	4
**Literature.....	4	4	
**Literature or Philosophy.....			4
***Electives.....	4	4	4
	15	15	15
Senior			
Senior Project (Hist 460).....	2		
European History at 300-400 level.....	3	3	
History at 300-400 level.....		3	7
Social Sciences (other than History) at 300-400 level.....		3	3
**Philosophy or Art.....	3		
***Electives.....	7	6	5
	15	15	15

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in History and other subjects.

* Select according to General Education requirement; must include one sequence course for three quarters with a minimum of 9 units.

† Typing proficiency is required for graduation. A student who does not type may use one unit of elective credit to take Bus 141 to satisfy the requirement.

** To be selected in accordance with the General Education requirement.

*** At least 18 units must be at the 300-400 level. Two years of foreign language are highly recommended.

JOURNALISM DEPARTMENT

Department Head, John R. Healey

Vincent J. Gates
James H. Hayes

Donald N. Holt
Helen P. Kelley

Loren L. Nicholson
Ed J. Zuchelli

Modern journalism places a premium on specialists who have acquired familiarity with a specific field in addition to basic professional training. To meet this need, the Journalism Department offers a program leading to the bachelor of science degree in journalism with concentrations in different occupational areas of journalism.

All journalism majors must complete the basic journalism curriculum which includes fundamental journalism courses and supplementary courses in humanities, social sciences, and natural sciences. Each major must also complete a specified number of required and elective courses in a chosen field of concentration.

All journalism majors are expected to serve as staff members of university communications media—Mustang Daily, the daily newspaper; Outpost, the newspaper's magazine supplement; the photojournalism supplement; or KCPR, the campus radio station.

Enrollment in journalism courses is open to qualified students of all other departments who wish to gain skills in the techniques and methods of advertising, public relations, publicity, publications, photography, and broadcasting.

CURRICULAR CONCENTRATIONS

Agricultural Journalism

This concentration prepares for farm or farm-city careers in reporting, editing, radio and television news; publication production; advertising copywriting, layout, selling; public relations and publicity; photography; information. Twenty-one of the elective units must be chosen with the approval of the adviser.

Broadcast Media

This concentration emphasizes the news and public affairs aspects of radio and television broadcasting. The emphasis is on training in news gathering and writing, as well as announcing. Responsibility is stressed.

News-Editorial Journalism

This concentration prepares for the news and editorial departments of newspapers and news agencies.

Photojournalism

This concentration prepares for opportunities in newspapers, magazines and television: training in still and movie film work, and in color and black and white. Emphasis is in using words and pictures together in understanding and interpreting today's society.

Public Relations-Advertising

This concentration includes theory, practice and techniques in the preparation of public relations and advertising materials. It prepares students for first jobs with communications media and corporate enterprises.

CURRICULUM IN JOURNALISM

Freshman	F	W	S
Mass Media and Society (Jour 118)	3		
English Composition (Engl 114, 115)	4	4	
Data Processing (CSc 100)			2
Mathematics (Math 100 or 102)		3	
Life science	3		
Natural science		3	3
Reporting (Jour 203)			4
Introduction to Sociology (Soc 105)			3
Health Education (PE 250)	2		
Physical Education Activity	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
§Electives and courses to complete major	6	5	3
	18½	15½	15½
Sophomore			
Mass Media History (Jour 201)	3		
Basic Photography (Jour 221)		3	
Introduction to Philosophy (Phil 101)			3
Communication Theory (Sp 214)			4
Reporting II (Jour 304)		3	
Physical science	3		
Natural science			3
Survey of Economics (Ec 201)	3		
American Government (Pol Sc 201)	3		
American Democracy and World Affairs (Hist 206)		5	
General Psychology (Psy 202)			3
Principles of Speech (Sp 200)			3
Physical Education Activity	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
§Electives and courses to complete major	5	6	
	17½	17½	16½
Junior			
Introduction to Conservation (Cons 311)		3	
American Political Processes (Pol Sc 302)			3
American Literature (Engl 311)	4		
Literature elective		4	
Humanities elective			3
Urban Sociology (Soc 313)			3
§Electives and courses to complete major	12	8	8
	16	15	17
Senior			
State and Local Government (Pol Sc 401)	3		
Senior Project (Jour 460)	3		
Geography elective			3
Media Internship (Jour 444)	9		
Mass Media Law (Jour 402)		3	
§Electives and courses to complete major		13	15
	15	16	18

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Journalism and other subjects.

§ 21 of the elective units must be chosen with the approval of the adviser in a field of concentration.
 † Unless already acceptable typists, majors will be required to attain typing proficiency during their freshman year.

MUSIC DEPARTMENT

Department Head, Alexander Capurso

George C. Beatie

Ronald V. Ratcliffe

Clifton E. Swanson

William V. Johnson

John G. Russell

Graydon Williams

Stanley A. Malinowski

The purposes of the courses in the Music Department are to give all musically inclined students the opportunity to participate in college musical organizations and to further their proficiency both in singing and in playing instruments; to give all students interested in music a broader insight into the general field of music through courses in appreciation, theory, harmony, and music history; and to provide the prospective teacher with basic skills and instructional techniques in music required for the general elementary credential.

It is necessary that the student have some previous experience with a musical instrument in order to try out for band, brass, chamber, and orchestral ensembles, and for dance orchestra. While previous experience in choral singing is helpful, it is not mandatory for the student trying out for the men's glee club and the women's glee club.

Students enrolled in one of the teacher education majors may elect a teaching minor in music. This program requires that a minimum of 30 units be taken, at least 18 of which must be 300 or 400 numbered courses. Those interested in this program should consult an instructor in the Music Department. Demonstration of music skill in piano may be by audition or by satisfactory performance in Mu 111, 112, 113. Participation in a music activity for at least three quarters is recommended.

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Music and other subjects.

PHILOSOPHY DEPARTMENT

Department Head, James T. Culbertson

Arthur C. W. Bethel

Russell A. Lascola

Stanislaus J. Dundon

Mary D. Sweet

Maurice Hanna

Frederick J. O'Toole

The courses offered in the Philosophy Department are intended to give the student a more comprehensive view of the world than he might otherwise get. The program in philosophy should supplement the courses he takes in his major and should help him understand the relation of his field to other investigations, particularly to scientific, religious and social movements. The courses call attention to the perennial questions reflective people have asked concerning man and his world, and help the student to develop his own personal philosophy.

This program will acquaint the student with the developments in metaphysics (the nature of reality), epistemology (the means by which knowledge is acquired), axiology (value theory), and logic.

The courses in the Philosophy Department give all students the opportunity to participate in philosophical discussion and further their proficiency in expounding and defending philosophical positions.

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Philosophy and other subjects.

SPEECH COMMUNICATION DEPARTMENT

Department Head, James R. Emmel

Robert L. Andreini
Robert L. Cleath
James R. Conway

Evelyn K. deVoros
Robin Lake

Keith E. Nielsen
J. Murray Smith

The Speech Communication Department, through its courses in speech and drama, serves the entire University. Its offerings enable students to fulfill requirements in general education, to advance programs of preparation and vocational objectives in their chosen fields, and to enhance avocational pursuits and cultural development.

The primary objectives of the department are to prepare prospective teachers of speech for positions in elementary and secondary schools, and to provide courses for students planning to enter many other fields related to the communicative arts and sciences.

The Speech Communication Department offers an academic teaching major, a speech minor, and a drama minor, available to all teacher candidates. All speech majors must complete the basic speech curriculum and consult their advisers in the choice of electives to round out their programs and fulfill their minors. Both major and minor programs are geared not only to provide broad theoretical knowledge of the speech field, but also to give students extensive experience in diversified speech activities.

A variety of co-curricular activities is available for students interested in the speech arts. Intercollegiate forensic tournaments provide opportunities for Cal Poly speakers to compete with students from other universities and colleges in debate and other speech events. The college drama program annually presents six productions, three produced by the Department, and three sponsored by the Drama Committee of ASI Programming Board. A broad spectrum of dramatic productions brings classical, musical, and modern plays to the campus community. Additional speech activities include speechmaking to community audiences, programs of oral interpretation, laboratory drama presentations, and radio and television programming.

CURRICULUM IN SPEECH COMMUNICATION

Freshman	F	W	S
Principles of Speech (Sp 200)	3		
Professional Fields of Speech (Sp 111)	1		
Introduction to Theater (Dr 220)			3
Argumentation (Sp 215)		4	
English Composition (Engl 114, 115)	4	4	
History of Civilization (Hist 101, 102)		5	5
† Natural sciences	3	3	3
Physical Education Activity	½	½	½
General Psychology (Psy 202)			3
Electives	4		
	15½	16½	14½
Sophomore			
Communication Theory (Sp 214)			4
Essentials of Discussion (Sp 217)	4		
Forensic Activity (Sp 300)	1	1	
Voice and Phonetics (Sp 306)		4	
Introduction to Genres (Engl 204)	4		
Mathematics for General Education (Math 100)	3		
† Natural sciences		3	3
Survey of Economics (Ec 201)			3
Health Education (PE 250)			2
Physical Education Activity	½	½	½
† Literature or Philosophy		3	
Electives	3	5	4
	15½	16½	16½

† To be selected in accordance with the General Education requirement.

Speech

	F	W	S
Junior			
Forensic Activity (Sp 300)	1		
Advanced Composition (Engl 300 or 304)			3
Introduction to Speech Pathology (Sp 302)	4		
Persuasion (Sp 304)		4	
Oral Interpretation (Sp 305)			4
Rhetoric (Sp 317, 318)	4	4	
American Government (Pol Sc 201)	3		
Growth of American Democracy (Hist 204)		3	
United States in World Affairs (Hist 205)			3
* Electives	4	4	5
	16	15	15
Senior			
American Public Address (Sp 408, 409)	4	4	
Senior Project (Sp 461)		2	
Undergraduate Seminar (Sp 463)	2		
Broadcast Announcing (Jour 326)			3
Acting (Dr 320)	3		
Directing (Dr 321)		3	
Introduction to Shakespeare (Engl 210)			4
* Electives	6	6	8
	15	15	15

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Speech, Drama and other subjects.

* Of the total elective units in the junior and senior years, 12 are restricted electives to be chosen in speech/drama at the 300-400 level with the approval of a departmental adviser; 15 of the remaining elective units must also be at the 300-400 level.



SCHOOL OF ENGINEERING AND TECHNOLOGY



CHART OF RECOMMENDED COMMUNITY COLLEGE PREPARATION FOR ENGINEERING AND TECHNOLOGY CURRICULA CALIFORNIA POLYTECHNIC STATE UNIVERSITY, SAN LUIS OBISPO

[illegible]

SCHOOL OF ENGINEERING AND TECHNOLOGY

Robert G. Valpey, Dean

Thomas W. Carpenter, Associate Dean

The Engineers' Council for Professional Development defines engineering "as the profession in which a knowledge of the mathematical and natural sciences gained by study, experience, and practice is applied with judgment to develop ways to utilize economically the materials and forces of nature for the benefit of mankind."

Engineering at Cal Poly is strongly oriented toward preparing young people for immediate entry into the practice of engineering in the industrial world upon graduation from one of the four-year bachelor's degree programs. Each student selects his major as a freshman and takes at least one course per quarter in that major from the first quarter at Cal Poly. This process increases motivation to master the mathematics, basic science, and engineering science which constitute a very important half of each engineering curriculum.

Engineering graduates of Cal Poly are in great demand and find an endless variety of engineering challenges awaiting them. They enter design, manufacturing, research, development, sales, maintenance, operation, etc. in industry, government, consulting firms, and many related activities. Increasing numbers find employment outside of the engineering profession in positions where an engineering education is either required or preferred.

Engineering curricula offered in the School of Engineering and Technology leading to the Bachelor of Science degree are: Aeronautical Engineering, Electrical Engineering, Electronic Engineering, Engineering Science, Environmental Engineering, Industrial Engineering, Mechanical Engineering, Metallurgical Engineering, Transportation Engineering.

The School of Engineering also offers curricula leading to the Bachelor of Science degree in Engineering Technology and Industrial Technology and the Bachelor and Master of Arts in Industrial Arts. Both industrial arts degrees are offered by the Industrial Technology Department.

Engineering Technology is defined by the Engineers' Council for Professional Development as that part of the technological field which requires the application of scientific and engineering knowledge and methods combined with technical skills in support of engineering activities; it lies in the occupational spectrum between the craftsman and the engineer at the end of the spectrum closest to the engineer.

Industrial technology is defined by the National Association of Industrial Technology as follows:

Industrial Technology is a baccalaureate degree program designed to prepare individuals for technical managerial, production supervisory, and related types of professional leadership positions.

Industrial Arts provides professional and credentialing preparation of future industrial education teachers for the secondary schools and community colleges.

Attention is directed to the preceding chart on recommended junior college preparation for engineering and technology major curricula. This chart should be studied and followed in order to prevent loss of time in completing the program after transferring to Cal Poly. In addition this college grants credit for lower division work in accordance with provisions agreed upon in the Engineering Liaison Committee.

COOPERATIVE PROGRAMS

The School of Engineering and Technology offers cooperative work-study programs in which students gain practical experience by working in industry or government installations, usually every other quarter, alternating periods of work and study. Under a cooperative program the students receive experience in their profession plus income during work periods.

In general, students under these programs will require more time to complete curriculum requirements, depending upon the time of starting and the nature of the individual's work-study plan. Cal Poly attempts to place students in programs which are to their best educational and financial advantage.

Students in a cooperative program are considered by Cal Poly to be continuing students while they are employed in industry. They may reside in Cal Poly housing during work periods and may attend student activities provided they pay the activity fee.

MASTER OF ENGINEERING DEGREE

The Master of Engineering curriculum offers a broadly based program supported by the entire School and the Agricultural Engineering Department in the School of Agriculture and Natural Resources. It is not primarily a program for specialization in any one engineering discipline. It is designed as an interdisciplinary program for the generalist, the project leader, instead of for the specialist in one particular area.

In more detail, the objectives of the program are to provide:

1. The appropriate job-entry education for the more complex areas of engineering such as research and development, innovative design, and systems analysis and design.
2. Both updating and upgrading opportunities for practicing engineers.
3. Appropriate graduate preparation for further graduate study in engineering leading to the Doctor of Engineering or Ph.D. degree.
4. Quality preparation for teachers of pre-engineering, engineering technology, and most aspects of undergraduate engineering curricula.
5. A useful graduate education for foreign students for use in their homelands.
6. An excellent base for lifelong individual study for the graduate to keep current in his profession.

CURRICULUM FOR THE MASTER OF ENGINEERING DEGREE

(For University requirements see the *Graduate Study Bulletin*)

	<i>Units</i>
Engr 599—An interdisciplinary design project thesis. (Units per quarter 2, 2, 5)	9
Mathematical Science—at least one course at the 500 level and not more than two courses at the 400 level	9
Engineering courses at the 500 level in a field in one engineering department....	6
Engineering courses in a field in a second engineering department—at least one course at the 500 level and not more than two courses at the 400 level	9
A physical science, or an engineering science not used above. The concept is to give further strength in one related area of interest at the 400 level or above, such as materials, electromagnetics, physics, mechanics, computers, etc.	6
Electives at the 400 level or above. In some cases, these courses may be needed to complete prerequisites for courses required above	6

45**

** At least 24 units must be in courses organized primarily for graduate students (500 level).

AERONAUTICAL ENGINEERING DEPARTMENT

Department Head, Charles P. Davis

Alfred E. Andreoli
Frank J. Hendel
William L. Hendricks

Jon A. Hoffmann
Stuart E. Larsen
Doral R. Sandlin

Robert E. Sennett
Donald E. Struble

The Aeronautical Engineering curriculum prepares students for engineering work dealing with the structure, propulsion, control, and ground support equipment for aircraft, missiles, and spacecraft. The problems faced by the aerospace industry offer an unusual engineering challenge. Much of the analysis must be accomplished at the very frontiers of knowledge yet products must nevertheless be designed and manufactured. Thus, an exceptionally wide gamut of engineering abilities is required within the industry.

The curriculum of the Aeronautical Engineering Department is accredited by the Engineers' Council for Professional Development. It places emphasis on both analysis and design. Supplementary to both is the basic work in drafting, shops, and laboratory. Throughout the entire four-year curriculum there is constant interplay between theory and application. Opportunities are available for advanced elective work in the student's field of special interest.

Graduates of the Aeronautical Engineering Department obtain employment in all phases of the aerospace industry such as general design, aerodynamics, stress analysis, flight testing, and field engineering.

The department has laboratories for fabrication, propulsion, structural test, and aerodynamics, and also has two design rooms and a hangar with adjoining airstrip.

The department sponsors a student chapter of the national society—the American Institute of Aeronautics and Astronautics.

CURRICULUM IN AERONAUTICAL ENGINEERING

Freshman	F	W	S
Aerospace Fundamentals (Aero 121, 122, 123)	2	2	2
* Manufacturing Processes	2		1
Digital Computer Applications (Engr 251)			2
Applied Descriptive Geometry (ET 141)	2		
Analytic Geometry and Calculus (Math 141, 142, 143)	4	4	4
General Physics (Phys 131, 132)		4	4
Freshman Composition (Engl 104)	3		
Introduction to American Literature (Engl 208)			4
General Biology (Bio 101)	3		
General Psychology (Psy 202)		3	
General Chemistry (Chem 124)			4
Physical Education Activity	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Sophomore	16$\frac{1}{2}$	17$\frac{1}{2}$	17$\frac{1}{2}$
Strength of Materials (Aero 207)			5
Strength of Materials Laboratory (Aero 229)			1
Electric Circuit Theory (EE 201)			4
Manufacturing Processes	1		
General Physics (Phys 133)	4		
Engineering Mechanics (ME 211, 212)	3	4	
Analytic Geometry and Calculus (Math 241)	4		
Differential Equations (Math 242)		4	
Advanced Engineering Mathematics (Math 318)			4
General Chemistry (Chem 125)	4		
Introduction to Numerical Methods (CSc 332)			3
American Government (Pol Sc 201)		3	
† Humanities		3	
Physical Education Activity	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
† Literature or Philosophy		3	
	16$\frac{1}{2}$	17$\frac{1}{2}$	17$\frac{1}{2}$

* To be selected from Weld 141, 142, 144, 251, 252; MP 141, 142, 143, 144, 145, 153, 154; IE 141.

† To be selected in accordance with the General Education requirement with adviser approval.

Aeronautical Engineering

Junior	F	W	S
Aerothermodynamics (Aero 301, 302, 303)	5	5	5
Aerodynamics (Aero 306)			5
Stress Analysis (Aero 324)		4	
Analog Computers (Aero 322)			4
Electronics (EL 321)	4		
Materials Engineering (Met 306)	3		
Survey of Economics (Ec 201)	3		
Report Writing (Engl 218)			3
American Democracy and World Affairs (Hist 206)		5	
Mechanical Vibrations (ME 316)		3	
	15	17	17
Senior			
Stability and Control (Aero 415)	3		
Aero Design (Aero 444, 445)		4	4
Senior Project (Aero 461, 462)	2	2	
Undergraduate Seminar (Aero 463)			2
Gas Dynamics I (Aero 404)	3		
Advanced Structures (Aero 408)	4		
Propulsions (Aero 401)		4	
Technical elective		5	3
Human Values in Engineering (Hum 402)			3
Electives	6		3
	18	15	15

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Aeronautical Engineering and other subjects.

† To be selected in accordance with the General Education requirement with adviser approval.



ELECTRONIC AND ELECTRICAL ENGINEERING DEPARTMENT

Department Head, Evan R. Owen

Deputy Department Head, William F. Horton

Warren R. Anderson
Richard A. Bucich
Thomas T. L. Chou
Michael M. Cirovic
Edward J. Clerkin
Clifford B. Cloonan
S. K. Datta
Richard K. Dickey
Eugene D. Fabricius

Freeman Freitag
Saul Goldberg
Michael Hawes
Harry Hazebrook
Harold J. Hendriks
Charles A. Herald
Russell Korsmeyer
William B. Lindsay
John W. McCormbs

Wayne E. McMorran
Shien-Yi Meng
Larry D. Moore
John B. Rapp
Jacob Sabto
Fred H. Steuck
James H. W. Tseng
Donley J. Winger
Chuan-Sung Yeh

The Electronic and Electrical Engineering Department offers two degree programs, which are accredited by the Engineers' Council for Professional Development: the B.S. Degree in Electronic Engineering, and the B.S. Degree in Electrical Engineering. The student must declare one of these two majors upon applying for admission. Because the freshman and sophomore years of the curricula in these majors are the same, the student may change his major if he so desires as late as the early part of his junior year.

The department's main objective is to provide a sound theoretical background along with up-to-date, immediately useful, practical engineering knowledge to each graduating engineer. The program of study involves student contact with the engineering field through freshman electrical and electronic engineering courses which provide a basic and practical background for the engineering student. The balance of the freshman and sophomore program of study includes science, mathematics preparation required for the upper division engineering courses, additional basic circuits and fields courses, and a course in computer programming. The total program involves a relatively large number of laboratories where practical application of classroom theory is carried out.

The senior engineering student may select specialized courses with the aim of making himself of more immediate value to industry. Those students who wish may select appropriate courses to prepare for graduate work. A senior design project is required of all students. It permits the application of engineering knowledge to practical problems of design. Instruction in the social sciences and humanities extends over all four years.

Students are encouraged to participate in the three clubs sponsored by the department. These are the Institute of Electrical and Electronic Engineers Student Branch, a professional organization; the Poly Phase Club, an active socially oriented organization; and Eta Kappa Nu, a national Electrical and Electronic Engineering Society.

BASIC CURRICULUM

The first two years of the Electronic Engineering and Electrical Engineering curricula have been designed to introduce the student to material which is basic to both of these disciplines.

Freshman	F	W	S
Intro to Electronic & Electrical Engr (EL 131, 132)		2	2
Orientation (EE 110)	1		
#Manufacturing Processes	2		
Interpretation of Technical Drawings (ET 153)		1	
Analytic Geometry and Calculus (Math 141, 142, 143)	4	4	4
General Chemistry (Chem 124, 125)	4	4	
General Physics (Phys 131, 132)		4	4
Freshman Composition (Engl 104)	3		
Report Writing (Engl 218)			3
Life science			3
Physical Education Activity	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
	14½	15½	16½

Electrical Engineering

Sophomore	F	W	S
Electric Circuits (EE 211, 212)	4	5	
Introduction to Electric Fields (EL 207)			4
Engineering Mechanics (ME 211, 212)	3	4	
Digital Computer Applications (Engr 251)	2		
Materials Engineering (Met 306)			3
American Democracy and World Affairs (Hist 206)			5
Analytic Geometry and Calculus (Math 241)	4		
Differential Equations (Math 242)		4	
Advanced Engineering Mathematics (Math 318)			4
American Government (Pol Sc 201)	3		
Electronic Assembly Techniques (MP 243)			1
Manufacturing Processes (MP 143)		1	
Survey of Economics (Ec 201)		3	
Physical Education Activity	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
	16 $\frac{1}{2}$	17 $\frac{1}{2}$	17 $\frac{1}{2}$

CURRICULUM IN ELECTRICAL ENGINEERING

Electronic Engineering is a branch of engineering dealing with the development, design and application of devices, circuits and systems for use in the fields of communication, instrumentation, controls, computers, information processing and display. The program of study involves basic circuit theory, field theory, and device theory, followed by logic and switching circuit design. Courses are constantly updated to deal with the latest technical developments in the electronics field.

Senior elective courses provide specialized information in such areas as solid state devices, advanced communications, computer system design, analog computers, hybrid computers, microwave engineering, active and passive network synthesis, and microelectronic circuit engineering.

The department has a number of well equipped laboratories which support this program. These include laboratories in microwaves, analog computers, digital computers, electronic circuits, networks, and solid state microelectronics.

Junior			
Analysis of Engineering Systems (EE 334)		3	
Electromechanics (EE 304)	3		
†† Digital Computers (EE 423)			3
Advanced Circuit Analysis (EE 301)	4		
Heat Transfer (Env E 313)			3
Power Transmission (EE 303)			4
Electronic Devices and Circuits (EL 307)	5		
Electronic Circuits I & II (EL 308, 309)		5	5
Modern Physics (Phys 211)	4		
Thermodynamics (ME 302)		3	
† Literature or Philosophy		3	
† Humanities elective			3
** Approved technical elective		3	
	16	17	18
Senior			
Electromagnetic Fields (EE 401)	3		
Control Systems (EE 431)		3	
Senior Project (EE 461, 462)	2	2	
Undergraduate Seminar (EE 463)	2		
* Approved technical electives	6	4	6
Power Systems Analysis (EE 406)	4		
Human Values in Engineering (Hum 402)		3	
† Literature or philosophy		4	
Psychology elective			3
Electives			9
	17	16	18

† To be selected in accordance with General Education requirements.

†† May substitute EL 319.

To be selected from IE 141; MP 141, 142, 143, 144; Weld 141, 145, 151.

CURRICULUM IN ELECTRONIC ENGINEERING

Electrical Engineering is the branch of engineering dealing with the generation, distribution, control and utilization of electrical power, including industrial process control systems. The program of study includes basic circuits, devices, network theory, and instruction in electrical machinery. The senior student may elect such specialized areas as advanced control systems, power systems analysis, energy conversion, power system protection and stability, and solid state motor control. The department sponsors the Electric Power Institute, which is supported by major West Coast utilities and major electrical equipment manufacturers. This Institute provides for the development of specialized up-to-date advanced seminars and lectures in the power field, as well as some student and faculty exchange opportunities. The department has a control laboratory, a machinery laboratory, electrical network analyzer and computer laboratories that support its program.

Junior	F	W	S
Electronic Devices and Circuits (EL 307)	5		
Electronic Circuits I & II (EL 308, 309)		5	5
Advanced Circuit Analysis (EL 301)	4		
* Approved technical electives		3	
Signal Transmission (EL 303)			4
Electromechanics (EE 304)	3		
Analysis of Engineering Systems (EE 334)		3	
** Logic and Switching Circuits (EL 319)			3
Thermodynamics (ME 302)		3	
Heat Transfer (Env E 313)			3
Modern Physics (Phys 211)	4		
† Humanities elective			3
† Literature or Philosophy elective		3	
	16	17	18
Senior			
Electromagnetic Fields (EL 401)	3		
Senior Project (EL 461, 462)	2	2	
Undergraduate Seminar (EL 463)	2		
Control Systems (EE 431)		3	
* Approved technical electives	6	4	6
Solid State Physics (Phys 412)	3		
Solid State Physics Laboratory (Phys 452)		1	
Human Values in Engineering (Hum 402)		3	
† Literature or philosophy elective		4	
Psychology elective			3
Electives			9
	16	17	18

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Electronic and Electrical engineering and other subjects.

** May substitute EE 423.

* A minimum of 1 unit of course work in Analog Computers, and a minimum of 3 units in Engineering Science bearing non-EL or EE prefixes are required. Three Senior laboratories with EL or EE prefixes are required.

† To be selected in accordance with General Education requirements.

ENGINEERING SCIENCE

(Interdisciplinary Program)

Coordinator, Jacob Sabto

The curriculum in Engineering Science is designed for those students seeking comprehensive education in the fundamental principles and concepts of engineering as distinguished from specialization in one engineering discipline. It is a broad, flexible program in engineering which provides ample opportunity for each student (with the aid of his adviser) to plan a program to meet his personal career objectives.

The engineering sciences are based on an extensive study of mathematics, physics, and chemistry. They are (1) mechanics of solids and fluids, (2) electrical science including electric and magnetic fields, circuits, and electronics, (3) thermodynamics and statistical mechanics, (4) materials science, (5) information theory, (6) logic and computing devices, (7) systems analysis, and (8) transfer and rate processes, including heat and mass transfer.

The curriculum provides ample elective time for the selection of courses appropriate to the student's career objectives. Of the total elective units, 21 are required to be chosen with the approval of the student's adviser.

CURRICULUM IN ENGINEERING SCIENCE

Freshman	F	W	S
Digital Computer Applications (Engr 251)			2
* Manufacturing Process	2	2	
Applied Descriptive Geometry (ET 141)			2
Analytic Geometry and Calculus (Math 141, 142, 143)	4	4	4
General Chemistry (Chem 124, 125)	4	4	
General Physics (Phys 131, 132)		4	4
Freshman Composition (Engl 104, 218 or 105)	3	3	
Introduction to Literature (Engl 207)			3
** Life Science	3		
Physical Education Activity	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
	<u>16$\frac{1}{2}$</u>	<u>17$\frac{1}{2}$</u>	<u>15$\frac{1}{2}$</u>
Sophomore			
Engineering Mechanics (ME 211, 212)	3	4	
Strength of Materials (Aero 207)			5
Strength of Materials Laboratory (Aero 229)			1
Electric Circuit Theory (EE 201)		4	
Analytic Geometry and Calculus (Math 241)	4		
Differential Equations (Math 242)		4	
Advanced Engineering Mathematics (Math 318)			4
General Physics (Phys 133)	4		
Modern Physics (Phys 211)		4	
Principles of Economics (Ec 211)			3
General Psychology (Psy 202)			3
** Literature	4		
Physical Education Activity	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
	<u>15$\frac{1}{2}$</u>	<u>16$\frac{1}{2}$</u>	<u>16$\frac{1}{2}$</u>

* To be selected from MP 141, 142, 143, 144, 145; Weld 141, 142, 144, 145.

** To be selected in accordance with the General Education requirements.

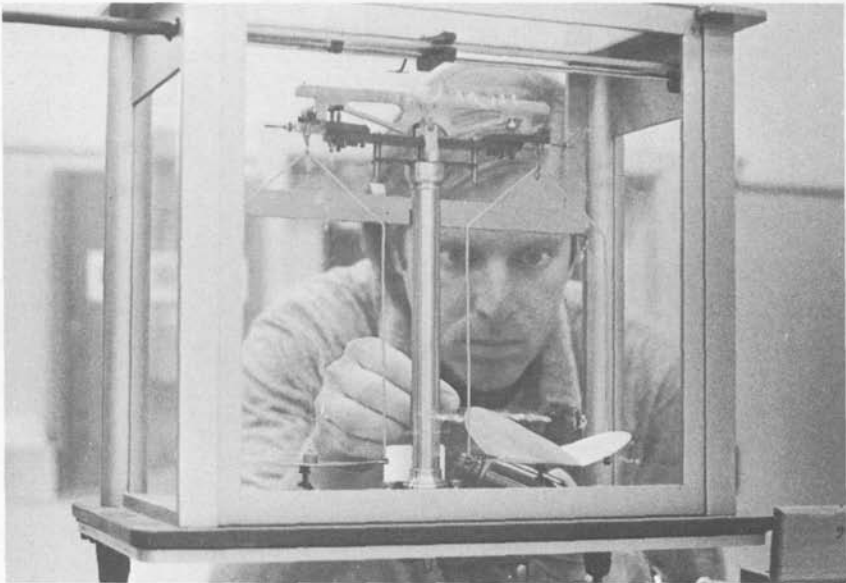
Engineering Science

	F	W	S
Junior			
Analog Computer Techniques (Aero 322)		4	
Electronics (EL 321)	4		
Instrumentation and Control Systems (EL 322)		4	
Energy Conversion Electromagnetics (EE 325)			4
Theory of Materials (Met 301, 302)	4	4	
Statistical Analysis (Stat 321, 322)	3	3	
** Humanities elective			3
American Government (Pol Sc 201)	3		
American Democracy and World Affairs (Hist 206)			5
† Electives	3	2	5
	17	17	17
Senior			
Senior Project (Engr 461, 462)	2	2	
Undergraduate Seminar (Engr 463)			2
Thermodynamics (ME 302, 303)	3	3	
Heat Transfer (EnvE 313)			3
Fluid Mechanics (ME 341)	3		
Mechanical Vibrations (ME 316)		3	
Operations Research (IE 304, IE 419 or EnvE 325)		3	3
Human Values in Engineering (Hum 402)	3		
† Electives	6	6	9
	17	17	17

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Engineering and other subjects.

** To be selected in accordance with the General Education requirement.

† Twenty-two of the 31 elective units must be chosen with the approval of the adviser.



ENGINEERING TECHNOLOGY DEPARTMENT

Department Head, James M. McGrath

Ray R. Allen	Earl R. Hesck	William E. Krupp
Frederick M. Bergthold, Jr.	Robert K. Janeway	William J. Phaklides
Ellard W. Betz	Robert M. Johnston	R. Wallace Reynolds
Enrico P. Bongio	Thomas D. Kay	Leo E. Rogers
Alex Gernert	Irvin J. Kogan	Glenn E. Seeber
Theodore G. Graves	Richard T. Kombrink	Alvin D. Varney
Richard E. Hall		

The Engineers Council for Professional Development defines engineering technology: "Engineering technology is that part of the technological field which requires the application of scientific and engineering knowledge and methods combined with technical skills in support of engineering activities; it lies in the occupational spectrum between the craftsman and the engineer at the end of the spectrum closest to the engineer."

The engineering technologist is somewhat more specialized than the engineer, focusing on a narrower range of subject matter and skills. In general, he has less depth in basic and engineering sciences but more specific capability and education in the skills areas and in the more routine aspects of design and production.

The curriculum in engineering technology is composed of a core of courses taken by all students and the curricular options shown below. Each student must select one of the options for an area of specialization. The options in Air Conditioning-Refrigeration Technology, Electronic Technology, Manufacturing Processes Technology and Mechanical Technology are accredited by the Engineers' Council for Professional Development.

CURRICULAR OPTIONS

Air Conditioning-Refrigeration Technology

Emphasizes heating, ventilating, air distribution, air conditioning and refrigeration systems. It leads to specialization in the environmental control field.

Electronic Technology

Emphasizes experimental and laboratory phases of the field with coverage of the principles and theory necessary for full comprehension of electronic instruments and essential design problems for units and systems.

Manufacturing Processes Technology

Emphasizes design and construction of production tooling, and the study of traditional and non-traditional methods of manufacturing processes.

Mechanical Technology

Emphasizes applied machine design, mechanical equipment and systems, mechanisms, and production.

Welding Technology

Emphasizes all aspects of the welding field including techniques, nondestructive testing, power sources, and production problems.

CURRICULUM IN ENGINEERING TECHNOLOGY

Freshman	F	W	S
Elements of Electricity (EE 122)		4	
Elements of Electronics (ET 124)	3		
Electronic Instrument Practices (ET 125)			4
Manufacturing Processes (MP 141)			1
Manufacturing Processes (MP 145)	2		
Manufacturing Processes (Weld 144)	2		
College Algebra and Trigonometry (Math 117)	5		
Technical Calculus (Math 131, 132)		4	4
College Physics (Phys 121, 122)		4	4
Freshman Composition (Engl 104, 105)	3	3	
Physical Education Activity	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Electives and courses to complete major			3
	$15\frac{1}{2}$	$15\frac{1}{2}$	$16\frac{1}{2}$

Engineering Technology

	F	W	S
Sophomore			
Applied Descriptive Geometry (ET 141)	2		
Engineering Drawing Systems (ET 142 or 122)		2	
Manufacturing Processes (IE 141)	1		
Digital Computer Applications (Engr 251)		2	
Statics (ME 205)		3	
Metallurgy for Engineering Technology (Met 235)			4
Technical Calculus (Math 133)	4		
College Physics (Phys 123)	4		
General Inorganic Chemistry (Chem 121)		4	
† Computer Science elective			3
Production Cost Estimating (IE 201)			3
Physical Education Activity	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Electives and courses to complete major	5	5	6
	16½	16½	16½
Junior			
Mechanics of Materials (Aero 202)	5		
Fluid Mechanics (ME 311)			3
Dynamics (ME 206)		4	
Electric Machines (EE 231)		4	
Statistical Analysis (Stat 321)	3		
Introduction to Literature (Engl 207)		3	
Report Writing (Engl 218)			3
American Government (Pol Sc 201)	3		
Survey of Economics (Ec 201)			3
Electives and courses to complete major	5	5	6
	16	16	15
Senior			
Senior Project (ET 461, 462)	2	2	
Undergraduate Seminar (ET 463)			2
Thermodynamics (ME 301)	4		
*Life science			3
Industrial Management (Mgt 311)			3
American Democracy and World Affairs (Hist 206)		5	
General Psychology (Psy 202)			3
*Literature or philosophy	4		
*Humanities elective		3	
Electives and courses to complete major	6	6	5
	16	16	16

AIR CONDITIONING-REFRIGERATION TECHNOLOGY OPTION

(Add Courses Below to Basic Curriculum)

Freshman	Junior
ET 121 Air Conditioning-Refrigeration Principles (3)	EnvE 204 Heating and Ventilating (5)
	ET 321 Air Distribution Systems.. (3)
Sophomore	EnvE 351 Environmental Engr. Measurement (2)
ET 123 Environmental Graphics (2)	
ET 201 Air Conditioning Refrigeration Codes (2)	Senior
EnvE 231-2-3 Fluid Systems (6)	ET 331-2 Refrigeration Systems ... (6)
Weld 155, 251 or 359 Welding .. (1)	ET 425-6 Air Conditioning Systems (6)
	ET 439 Instruments and Controls (3)

* To be selected in accordance with the General Education requirement.

† Select one course from CSc 218, 219, 221, 310, 331. Electronic option students take CSc 218.

Engineering Technology

ELECTRONIC TECHNOLOGY OPTION

(Add Courses Below to Basic Curriculum)

Sophomore		Junior	
EL 131, 132	Basic Circuits and Devices (2) (2)	ET 234	Passive Network Analysis (4)
ET 232-3	Electronic Circuits and Devices (8)	ET 333	Intro. to Microwaves (4)
Weld 151	Micro Bonding (1)	ET 334	Dig. Comp. Cir. Organ... (4)
Technical Electives (2)	Senior	
		ET 431	Active Linear Circuits (4)
		ET 432	Automatic Control (4)
		ET 433	Communication Systems (4)
		**ET 438	Mini Computer Technology (4)

MANUFACTURING PROCESSES TECHNOLOGY OPTION

(Add Courses Below to Basic Curriculum)

Freshman		Junior	
MP 142	Manufacturing Processes (1)	MP 321-2-3	Tool Design (9)
*MP 154	Manufacturing Processes (1)	MP 336	Numerical Control Machining (2)
Sophomore		IE 233	Elements of Numerical Control Machining (2)
MP 224	Advanced Turning (3)	IE 214	Production Control (2)
MP 225	Abrasive Machining and Finishing (2)	Senior	
MP 226	Advanced Machining Processes (3)	MP 434, 5, 6	Tool and Manufacturing Engineering (12)
ET 344	Advanced Design Graphics (2)		
Weld 359	Welding (1)		

MECHANICAL TECHNOLOGY OPTION

(Add Courses Below to Basic Curriculum)

Freshman		Junior	
ME 136-146	Thermal Systems (4)	*Aero 229	Strength of Materials Lab (1)
Sophomore		ET 320	Mechanisms (4)
MP 142	Manufacturing Processes (1)	ET 337	Instrumentation of Mechanical Systems (3)
ET 221	Mech Systems of Bldgs... (3)	ET 344	Advanced Design Graphics (2)
MP 154	Manufacturing Processes (1)	Senior	
IE 214	Production Control (2)	ET 421	Applied Machine Design (4)
IE 233	Numerical Control Machining (2)	ET 422	Applied Machine Design (4)
ET 237	Hydraulic Device Applications (3)	ET 437	Design of Mechanical Systems (4)
Weld 155, 251 or 359	Welding .. (1)		

WELDING TECHNOLOGY OPTION

(Add Courses Below to Basic Curriculum)

Sophomore		Junior	
Weld 155	Metallic Arc Welding (1)	Weld 324-5-6	Advanced Welding Technology (13)
Weld 235	Nondestructive Testing (5)	Senior	
Weld 236	Welding Power Sources (3)	IE 214	Production Control (2)
Weld 359	Advanced Welding (1)	Weld 434-5-6	Welding Design .. (9)
		MP 327	Tool Design (3)
		IE 232	Dimensional Metrology.... (2)

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Engineering Technology, Manufacturing Processes and other subjects.

* Recommended but not required.

** 8 units from ET 432, 433 and 438 must be selected with adviser's approval.

ENVIRONMENTAL ENGINEERING DEPARTMENT

Department Head, Walter E. Holtz

Ray R. Allen
Harold M. Cota

Rodney G. Keif
Dragoslav M. Misic

Philip W. B. Niles

Environmental Engineering is concerned with the interrelation of man, materials, and processes in a complex and changing environment. The broad field of Environmental Engineering includes Control of Air and Water Pollution, Industrial Hygiene, Reduction of Noise and Vibration, Air Conditioning, Heating, Ventilation, and Refrigeration.

The program offers a sound background in the fundamentals of thermodynamics, heat transfer, fluid mechanics, mass transfer, and physico-chemical characteristics of living and inanimate matter. The student will specialize in one of the curricular concentrations described below. The problem-oriented approach to instruction, in modern well-equipped laboratories, shops and design rooms, provides the student an excellent opportunity to gain understanding and experience as a joint exploration with the faculty. The curriculum is accredited by the Engineers' Council for Professional Development.

Student branches of the American Society of Heating, Refrigeration, and Air Conditioning Engineers and of the Institute of Environmental Sciences offer a vigorous program of technical and other activities, including field trips each year to the Los Angeles and San Francisco areas to study typical installations of systems. Student memberships are also available in the Air Pollution Control Association.

Graduates obtain employment primarily with consulting engineers, manufacturers, contractors, and governmental agencies.

CURRICULAR CONCENTRATIONS

Air Conditioning-Refrigeration

This concentration prepares students to enter those phases of engineering dealing particularly with thermal systems and their control in a variety of applications ranging from cold storage plants and modern buildings to hypersonic aircraft and missiles.

Air Pollution Control

This concentration provides training in the field of air pollution control. An engineering approach to the subject prepares the student to enter careers in air quality management, and industrial, public and private agencies concerned with solving problems of air pollution.

Water Pollution-Waste Management

This concentration provides training in two important areas of environmental quality control, approached from an engineering point of view. The student will be prepared for a career in industry or in public service which will be directed toward the improvement of the quality of our environment.

CURRICULUM IN ENVIRONMENTAL ENGINEERING

Freshman	F	W	S
Intro to Environmental Engineering (EnvE 101)	1		
General Psychology (Psy 202)	3		
Applied Descriptive Geometry (ET 141)	2		
Environmental Graphics (ET 122)		2	
Analytic Geometry and Calculus (Math 141, 142, 143)	4	4	4
General Physics (Phys 131, 132)		4	4
Freshman Composition (Engl 104, 105)	3		3
General Chemistry (Chem 124, 125)	4	4	
Organic Chemistry (Chem 226)			4
* Life Science Elective		3	
Physical Education Activity	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
	<hr/> 17 $\frac{1}{2}$	<hr/> 17 $\frac{1}{2}$	<hr/> 15 $\frac{1}{2}$

* To be selected in accordance with General Education requirements.

Environmental Engineering

Sophomore	F	W	S
Environmental Engr. Measurements (EnvE 351).....			2
Heating and Ventilating (EnvE 204)	5		
Fluid Systems (EnvE 231)	2		
Digital Computer Applications (Engr 251)		2	
Engineering Mechanics (ME 211, 212).....		3	4
Strength of Materials (Aero 207)			5
#Manufacturing Processes	2	2	
Analytic Geometry and Calculus (Math 241).....	4		
Differential Equations (Math 242)		4	
Advanced Engineering Mathematics (Math 318).....			4
General Physics (Phys 133)	4		
Statistical Analysis (Stat 321)		3	
American Government (Pol Sc 201).....		3	
Physical Education Activity	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
	<hr/> 17½	<hr/> 17½	<hr/> 15½
Junior			
System Design (EnvE 361, 362)		3	3
Noise and Vibration Control (EnvE 309).....	3		
Electronics (EL 321)		4	
Heat Transfer (EnvE 313)			3
Environmental Air Quality (EnvE 325).....	3		
Thermodynamics (ME 302)	3		
Fluid Mechanics (ME 341)		3	
Electric Circuit Theory (EE 201).....	4		
American Democracy and World Affairs (Hist 206).....			5
Survey of Economics (Ec 201)		3	
§Electives and courses to complete major.....	3	4	6
	<hr/> 16	<hr/> 17	<hr/> 17
Senior			
Advanced Mass and Energy Transfer (EnvE 403).....	3		
Automatic Process Control (EnvE 416).....			2
Senior Project (EnvE 461, 462)	2	2	
Undergraduate Seminar (EnvE 463).....			2
*Literature Elective		4	
*Literature or Philosophy			3
*Humanities Elective			3
Human Values in Engineering (Hum 402).....			3
§Electives and courses to complete major	12	9	4
	<hr/> 17	<hr/> 15	<hr/> 17

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Environmental Engineering and other subjects.

* To be selected in accordance with the General Education requirements.

§ 29 of the elective units must be chosen with the approval of the adviser according to the field of concentration.

To be selected from MP 141, 142, 144; IE 141; Weld 141, 142, 144.

INDUSTRIAL ENGINEERING DEPARTMENT

Department Head, Donald E. Morgan

George W. Cockriel
Frederick F. Fennema

Millard J. Fotter
James R. Golden

George E. Hoffman
Paul E. Scheffer

Industrial Engineering is concerned with engineering and management systems. A soundly structured engineering system utilizes and coordinates men, equipment, materials, and money to produce the desired quantity and quality of output, usually goods, within a specified time at minimum cost. A proficient management system effectively utilizes human resources through management decision models and management principles.

The industrial engineer becomes involved in the widest possible range of engineering activities including production, facilities planning, forecasting, quality and reliability assurance, systems economy, human factors and motivation, systems analysis, operations research, optimum resource allocation, data management, and the metrology of engineering test designs. The social, physical, and engineering sciences form an educational base for these activities.

The curriculum, accredited by the Engineers' Council for Professional Development, is oriented to provide industry with graduates available to produce with a minimum of additional training, and yet prepare students for successful entry into graduate level study. Active within the Department are two student chapters associated with national professional societies, the American Institute of Industrial Engineers (AIIE) and the Society of Manufacturing Engineers (SME).

Industrial engineering laboratories and equipment are used from matriculation until graduation to investigate and test theoretical principles.

CURRICULAR CONCENTRATIONS

Manufacturing

A selection of courses stressing the synthesis and improvement of the production process utilizing statistics, economics, operations research, social sciences, human factors, principles of management, and manufacturing methods.

Systems

A selection of courses stressing the analysis and synthesis of systems. Mathematical and statistical models for management planning and control including the concepts of human factors, information theory, and data feedback as applied to productive systems.

Measurement Science

A selection of courses stressing the assurance of achieving the required precision of all measurement and production operations, the theoretical principles and science of physical measurement as necessary in production and science.

CURRICULUM IN INDUSTRIAL ENGINEERING

Freshman	F	W	S
Introduction to Industrial Engineering (IE 101).....	3		
Industrial Systems Analysis (IE 123)			4
Manufacturing Processes (IE 141)		1	
* Manufacturing Processes		2	
Engineering Graphics (ET 151).....	2		
Digital Computer Applications (Engr 251)			2
Analytic Geometry and Calculus (Math 141, 142, 143)	4	4	4
General Chemistry (Chem 124, 125).....		4	4
English Composition (Engl 114)	4		
Report Writing (Engl 218).....			3
§ Literature elective		4	
§ Life Science elective.....	3		
Physical Education Activity	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
	16½	15½	17½

* MP 141, 142, 143, 144; Weld 141, 142, 144.

§ To be selected in accordance with the General Education requirement.

Industrial Engineering

Sophomore	F	W	S
Manufacturing Engineering Laboratory (IE 251)	4		
Industrial Costs and Controls (IE 239)		4	
Man-Machine Systems (IE 223)			4
* Manufacturing Processes	1		
Analytic Geometry and Calculus (Math 241)	4		
Differential Equations (Math 242)		4	
Statistical Analysis (Stat 321)			3
General Physics (Phys 131, 132, 133)	4	4	4
General Psychology (Psy 202)	3		
American Government (Pol Sc 201)		3	
American Democracy and World Affairs (Hist 206)			5
Physical Education Activity	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
	<hr/> 16½	<hr/> 15½	<hr/> 16½
Junior			
Operations Research (IE 304, 419)	3	3	
Human Factors Engineering (IE 319)	3		
Statistical Quality Control (IE 430)		3	
Manufacturing Design (IE 343)			4
Strength of Materials (Aero 207)		5	
Electric Circuit Theory (EE 201)			4
Engineering Mechanics (ME 211, 212)	3		4
Statistical Analysis (Stat 322)	3		
Principles of Economics (Ec 211, 212)		3	3
** Electives and courses to complete major	4	3	3
	<hr/> 16	<hr/> 17	<hr/> 18
Senior			
Engineering Economy (IE 414)	3		
Fundamentals of Supervision (IE 441, 442)	2	1	
Senior Project (IE 461, 462)	2	2	
Undergraduate Seminar (IE 463)			2
Thermodynamics (ME 302)	3		
Fluid Mechanics (ME 341)		3	
Electronics (EL 321)		4	
Human Values in Engineering (Hum 402)			3
Humanities elective			3
Literature or philosophy		3	
** Electives and courses to complete major	7	3	10
	<hr/> 17	<hr/> 16	<hr/> 18

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Industrial Engineering and other subjects.

* MP 141, 142, 143, 144; Weld 141, 142, 144.

** 18 or 19 of the elective units must be chosen with the approval of the adviser in a field of concentration.

INDUSTRIAL TECHNOLOGY DEPARTMENT

Department Head, J. M. McRobbie

Fred Abitia

Frank B. Barrows

William L. Bruckart

J. D. Frost

Roger L. Keep

Kenneth R. Kimball

N. L. Smith, III

J. Edward Strasser

Laurence F. Talbott

Raymond A. Wysock

The Industrial Technology Department offers two curricula which prepare graduates for employment in a broad range of professional positions in industrial management, industrial production, industrial marketing or industrial and public education. For those interested in employment in industry the course offerings qualify students for occupations in the mid-ground between engineering and business. For those planning, with a fifth year, to teach the technical subjects of industry there are both broad and specific offerings concerning course content and methods in all the major areas. A program leading to the Master of Arts degree is offered for qualified graduates interested in industrial education, whether in the public schools or in industry.

Emphasis is placed upon the study of tools, machines, materials, processes and products. Special consideration is given to the industrial application of mathematics, physics and chemistry. Also of major importance is the development of the ability to work with people concerning matters of a technical nature.

Each student gains a substantial general education through courses in the areas of language communication, social sciences, mathematics, physical education and the arts. His ability to communicate in technical areas is further developed through courses in technical writing and technical drawing.

The Industrial Technology Department's curricula provide for instruction and laboratory experiences in drafting, wood technology, electricity, electronics, metal technology, power technology, and graphic arts.

CURRICULUM IN INDUSTRIAL TECHNOLOGY

This Bachelor of Science degree program emphasizes preparation for technical leadership responsibilities with a broad variety of industries including manufacturing, communication, transportation and utility services. Graduates in the field of industrial technology function in the mid-ground between the applied aspects of engineering and administration. Students who enjoy working primarily with people in solving technical problems are particularly well suited for careers in industrial technology. Preparation for professional specialization in industrial sales, supervision of production, plant facilities, or quality assurance technology is provided through the selection of technical electives with adviser approval.

Freshman	F	W	S
Technical Computation (IT 101).....	2		
Introduction to Industrial Technology (IT 111).....	2		
Fundamentals of Technical Drawing (ET 151).....			2
*Manufacturing Processes		2	2
College Algebra and Trigonometry (Math 117).....	5		
Technical Calculus (Math 131)		4	
Freshman Composition (Engl 104, 105)	3	3	
College Physics (Phys 121, 122).....		4	4
Life science elective			3
Physical Education Activity.....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Electives	3	2	5
	15½	15½	16½

* Chosen from MP 141, 142, 143, 144; IE 141; Weld 141, 142, 144.

Industrial Technology

Sophomore	F	W	S
Marketing Principles (Mktg 204)			4
Industrial Electricity (IT 237)	5		
**Elementary Probability and Statistics (Stat 211)		3	
**Statistical Methods (Stat 212)			3
Humanities elective		3	
Principles of Economics (Ec 211, 212)	3	3	
Principles of Accounting (Actg 221, 222)		4	4
College Physics (Phys 123)	4		
Literature elective			4
Physical Education Activity	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Electives	4	2	1
	<u>16½</u>	<u>15½</u>	<u>16½</u>
Junior			
Industrial Electrical Systems (IT 331)	4		
Electronic Control Systems (IT 332)		4	
Electronic Computer Applications (IT 333)			3
Product Evaluation (IT 326)			2
Industrial Design (IT 346)			2
Power Technology (IT 222)		4	
Technical Sketching (IT 245)		2	
Industrial Materials (IT 329)			3
Industrial Management (Mgt 311)	3		
Business Law Survey (Bus 201)		3	
General Inorganic Chemistry (Chem 121, 122)	4		4
General Psychology (Psy 202)	3		
Literature or philosophy elective		3	
†Electives	2		2
	<u>16</u>	<u>16</u>	<u>16</u>
Senior			
Mechanical Systems (IT 431, 432, 433)	3	3	3
Industrial Product Development (IT 407)	3		
Technical Management Problems (IT 418)		4	
Senior Project (IT 461, 462)	2	2	
Undergraduate Seminar (IT 463)			2
Business & Human Relations (IR 415)	3		
American Government (Pol Sc 201)	3		
American Democracy and World Affairs (Hist 206)			5
†Electives	2	7	6
	<u>16</u>	<u>16</u>	<u>16</u>

** Consult with adviser. Stat 321-322 should be substituted for Stat 211-212 as prerequisites depending on the adviser-approved electives.

† 15 of the elective units in the junior and senior years must be chosen with the approval of the adviser.

CURRICULUM IN INDUSTRIAL ARTS

This major provides for the undergraduate professional preparation of future industrial education teachers at the secondary and junior college levels. Students select one concentration from the following six industrial areas: Automotives, Drafting, Electronics, Graphic Arts, Metals or Wood-Plastics. In addition to specialization in one field, the student receives a broad basic training in all of these specialties. Graduates of this major have an extensive understanding of industrial manufacturing procedures plus the ability to work well with students in helping them to become familiar with processes of industry. The program leads to a Bachelor of Arts degree.

The Standard Teaching Credential, with specialization in secondary teaching, is granted upon successful completion of this program and a fifth year of professional education courses and graduate work in the major field. Graduates with industrial experience may qualify for positions of responsibility with in-plant technical training programs.

Freshman	F	W	S
Technical Computation (IT 101).....	2		
Introduction to Industrial Technology (IT 111).....	2		
Fundamentals of Technical Drawing (ET 151).....	2		
#Manufacturing Processes	4		2
Industrial Wood Processes (IT 125).....		2	
College Algebra and Trigonometry (Math 117).....		5	
Freshman Composition (Engl 104, 105)	3	3	
College Physics (Phys 121, 122).....		4	4
Life science elective			3
Physical Education Activity.....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
*Electives and courses to complete major.....	2	1	6
	<hr/> 15 $\frac{1}{2}$	<hr/> 15 $\frac{1}{2}$	<hr/> 15 $\frac{1}{2}$
Sophomore			
Industrial Electricity (IT 237).....		5	
Wood Technology (IT 353).....			3
Advanced Composition (Engl 300)		3	
Principles of Speech (Sp 200).....	3		
Elementary Probability and Statistics (Stat 211).....		3	
Humanities elective	3		
Survey of Economics (Ec 201).....	3		
Introduction to Literature (Engl 207).....			3
Physical Education Activity.....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
*Electives and courses to complete major.....	6	4	9
	<hr/> 15 $\frac{1}{2}$	<hr/> 15 $\frac{1}{2}$	<hr/> 15 $\frac{1}{2}$

* From 23 to 26 of the elective units must be chosen with the approval of the adviser in a field of concentration. A minimum of 18 of these must be at the 300-400 level.

MP 141, 142, 143, 144; IE 141; Weld 141, 142, 144.

Industrial Technology

Junior	F	W	S
Power Technology (IT 222).....			4
Technical Sketching (IT 245).....		2	
Product Evaluation (IT 326).....			2
Plastics Technology (IT 327).....		2	
Industrial Materials (IT 329).....			3
Industrial Design (IT 346).....			2
General Inorganic Chemistry (Chem 121).....	4		
Physical Science (Chem 122 or Phys 123).....			4
General Psychology (Psy 202).....	3		
Educational Psychology (Ed 312).....		3	
Literature or philosophy elective.....		4	
Public Education in American Society (Ed 401).....	3		
*Electives and courses to complete major.....	3	5	3
	16	16	15
Senior			
Mechanical Systems (IT 433).....			3
Principles and Practices of Industrial Arts (IT 330).....			5
Approved 300-400 IT courses.....	3	3	4
Senior Project (IT 461, 462).....	2	2	
Industrial Relations (IR 314).....	3		
American Government (Pol Sc 201).....	3		
American Democracy and World Affairs (Hist 206).....		5	
*Electives and courses to complete major.....	4	5	4
	15	15	16

See COURSES OF INSTRUCTION section of the catalog for description of courses in Industrial Technology and other subjects.

CURRICULUM FOR THE MASTER OF ARTS DEGREE

Required:	Units
IT 520 Organization and Administration of Industrial Education.....	3
IT 521 Curriculum in Industrial Education.....	3
IT 522 Facility Planning in Industrial Education.....	2
IT 527 Trends and Issues in Industrial Education.....	3
IT 580 Graduate Seminar in Industrial Education.....	3
IT 599 Industrial Education Thesis or Project.....	5
Courses in professional education at the 500 level chosen with approval of the adviser.....	9
Elective courses at the 300, 400, and 500 levels, including a minimum of 6 additional units in industrial education, with adviser approval.....	17
	45

* From 23 to 26 of the elective units must be chosen with the approval of the adviser in a field of concentration. A minimum of 18 of these must be at the 300-400 level.

MECHANICAL ENGINEERING DEPARTMENT

Department Head, John J. Kane

Robert W. Adamson	Franklin S. Crane	James L. Meriam
James G. Andresen	Otto C. Davidson	Leon F. Osteyee
Edward H. Baker	Edward R. Garner	John Price
Ian C. Begg	Raymond G. Gordon	Charles R. Russell
Laurence H. Carr	Roger A. Keech	Ramesh T. Shah
	Fredrick B. Malmborg	Edward O. Stoffel

Mechanical engineering concerns itself primarily with the design, construction, and use of a wide variety of equipment ranging from manufacturing machinery and power generation equipment to consumer goods. Of primary concern to the mechanical engineer is the proper application of rigid, fluid, and thermal mechanics in the design and use of this equipment.

Graduates obtain employment primarily with manufacturers, contractors, public utilities, and governmental agencies. Types of work performed by graduates include design, engineering sales, engineering test, supervision of manufacture and erection.

The curriculum gives the student a thorough grounding in mechanical engineering and a choice of a curricular concentration in nuclear engineering or in general professional specialties as approved by his adviser. Engineering courses are found in all four years. In the junior and senior years, the professional specialties include such courses as turbomachinery, mechanical design, heat and mass transfer, mechanical control systems, and nuclear power plants. The curriculum is accredited by the Engineers' Council for Professional Development.

Laboratories are an important part of the student's education. He is enrolled in mechanical engineering laboratories from the beginning of his freshman year until his graduation. These laboratories include work in power generation, fluid flow, heat transfer, vibration, strength of materials, and others.

There are two organized student clubs in the Mechanical Engineering Department: a student branch of the Society of Automotive Engineers and the Mechanical Engineering Society. These clubs offer students an active program of professional and social activity.

CURRICULUM IN MECHANICAL ENGINEERING

Freshman	F	W	S
#Thermal and Mechanical Systems (ME 136-146, 134).....	4	4	
Applied Descriptive Geometry (ET 141)	2		
Interpretation of Technical Drawings (ET 153).....		1	
*Manufacturing Processes	1		2
Analytic Geometry and Calculus (Math 141, 142, 143).....	4	4	4
Digital Computer Applications (Engr 251)			2
General Chemistry (Chem 124, 125).....	4	4	
General Physics (Phys 131).....			4
Freshman Composition (Engl 104, 105)		3	3
Physical Education Activity.....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
	<hr/> 15 $\frac{1}{2}$	<hr/> 16 $\frac{1}{2}$	<hr/> 15 $\frac{1}{2}$

* Chosen from MP 141, 142, 143, 144; IE 141; Weld 141, 142, 144.

Qualified transfer students may, with departmental approval, substitute ME 234 and 4 units of approved technical electives.

Mechanical Engineering

Sophomore	F	W	S
Engineering Mechanics (ME 211, 212)	3		4
Strength of Materials (Aero 207)		5	
Strength of Materials Laboratory (Aero 229)		1	
Materials Engineering (Met 306)			3
Materials Engineering Laboratory (Met 341)			1
* Manufacturing Processes	2		
Modern Physics (Phys 211)			4
Calculus, Differential Equations (Math 241, 242)	4	4	
Advanced Engineering Mathematics (Math 318)			4
General Physics (Phys 132, 133)	4	4	
Survey of Economics (Ec 201)	3		
American Government (Pol Sc 201)		3	
Physical Education activity	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
	16½	17½	16½
Junior			
Introduction to Design (ME 327)		5	
Thermodynamics (ME 302, 303)	3	3	
Thermodynamics Laboratory (ME 343)			1
Fluid Mechanics (ME 341, 342)		3	5
Mechanical Vibrations (ME 316)	3		
Vibrations Laboratory (ME 317)	1		
Heat Transfer (EnvE 313)		3	
Electric Circuit Theory (EE 201)	4		
Electronics (EL 321)		4	
Energy Conversion and Electromagnetics (EE 325)			4
American Democracy and World Affairs (Hist 206)	5		
Psychology (Psy 202 or 311)			3
†† Electives and courses to complete major			4
	16	18	17
Senior			
Mechanical Control Systems (ME 422)	4		
Senior Project (ME 461, 462)	2	2	
Undergraduate Seminar (ME 463)			2
Human Values in Engineering (Hum 402)		3	
† Literature or Philosophy	3	4	
† Life Science			3
† Humanities			3
†† Electives and courses to complete major	8	8	9
	17	17	17

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Mechanical Engineering and other subjects.

* Chosen from MP 141, 142, 143, 144; IE 141; Weld 141, 142, 144.

† To be selected with adviser approval in accordance with the General Education requirement.

†† Of the total electives, 20 units must be chosen with the approval of the adviser in the student's field of concentration.

METALLURGICAL ENGINEERING DEPARTMENT

Department Head, Richard C. Wiley

Harry H. Honegger

Robert B. Leonesio

Orien W. Simmons

The Metallurgical Engineering Department prepares students for employment as metallurgical engineers, and also provides service courses in metallurgy to students in other departments of the college. The curriculum is accredited by the Engineers' Council for Professional Development. It offers opportunity to pursue specialized metallurgical areas on an elective basis in the senior year.

Students who graduate as metallurgical engineers are employed by private industry and government agencies to deal with problems of design and manufacture of metals and alloys, corrosion protection, nondestructive testing, application of materials to specific needs and requirements including process development. Typical position titles are metallurgist, metallographer, materials engineer, welding engineer, nondestructive test engineer, and inspection and quality control specialist.

The Metallurgical Engineering Department is well equipped with various laboratories and shops. There are two metallurgical engineering laboratories for student use. The metallography laboratory is equipped with the latest instruments for study of internal structures of metals and alloys. The metallurgy laboratory includes equipment for vacuum melting and processing, heat treatment, nondestructive testing, air melting furnaces, a "wet" laboratory, and a physical testing laboratory.

The department sponsors a combined student chapter of two national societies, the American Welding Society and the American Society for Metals. The chapter offers an active program of professional and social activity.

CURRICULUM IN METALLURGICAL ENGINEERING

Freshman	F	W	S
Introduction to Metallurgy (Met 121).....	2		
* Manufacturing Processes (Weld 144).....		2	
* Manufacturing Processes (MP 144).....			2
General Chemistry (Chem 124, 125).....	4	4	
General Physics (Phys 131).....			4
Analytic Geometry and Calculus (Math 141, 142, 143).....	4	4	4
Freshman Composition (Engl 104).....	3		
General Psychology (Psy 202).....		3	
§ Life Science.....	3		
Report Writing (Eng 218 or Eng 105).....		3	
Physical Education activity.....	½	½	½
§ Literature or Philosophy.....			4
Electives.....			2
	16½	16½	16½

* MP 141 and 142, or Weld 141 and 142 may be substituted for the MP 144 and Weld 144 respectively.

§ To be selected in accordance with the General Education requirement.

Metallurgical Engineering

Sophomore	F	W	S
Materials Engineering (Met 306)	3		
Materials Engineering Laboratory (Met 341)	1		
Physical Metallurgy (Met 222)		4	
Nonferrous Alloys (Met 223)			2
Digital Computer Applications (Engr 251)	2		
Engineering Mechanics (ME 211, 212)	3		4
Fundamentals of Tech Drawing (ET 151)			2
General Physics (Phys 132, 133)	4	4	
Analytic Geometry and Calculus (Math 241)		4	
Differential Equations (Math 242)			4
American Democracy and World Affairs (Hist 206)			5
American Government (Pol Sc 201)	3		
Survey of Economics (Ec 201)		3	
Physical Education Activity	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Electives		2	
	16 $\frac{1}{2}$	17 $\frac{1}{2}$	17 $\frac{1}{2}$
Junior			
Theory of Materials (Met 301, 302, 303)	4	4	4
Metallurgical Engineering (Met 324, 325, 326)	4	4	4
Statistical Analysis (Stat 321, 322)	3		3
Strength of Materials (Aero 207)		5	
Heat Transfer (EnvE 313)			3
Physical Chemistry (Chem 305, 306)		3	3
§ Humanities Elective	3		
Electives	3		
	17	16	17
Senior			
Advanced Theory of Materials (Met 421, 422, 423)	4	4	4
Applied Metallurgical Engineering (Met 424, 425, 426)	4	4	4
Senior Project (Met 461, 462)	2	2	
Undergraduate Seminar (Met 463)			2
Electric Circuit Theory (EE 201)	4		
Electronics (EL 321)		4	
Advanced Technical Topic	3		
Human Values in Engineering (Hum 402)		3	
§ Literature or Philosophy Elective			3
Electives			2
	17	17	15

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Metallurgical Engineering and other subjects.

§ To be selected in accordance with the General Education requirement.

TRANSPORTATION ENGINEERING DEPARTMENT

Department Head, Andrew D. Jones

Robert E. Sennett

Transportation Engineering is concerned with all types and facets of the transportation problems of the state and the nation. It is a program related to civil engineering in several ways but is unique in its emphasis on all aspects of transportation and related or auxiliary facilities.

The transportation engineer faces a never ending series of interesting and difficult problems to meet the constantly increasing requirements for mobility of our people. Students completing this program qualify for positions in local, state and federal government service as well as highway, airfield, and dock construction firms to mention only a few areas of possible employment.

The curriculum includes surveying, structures, and transportation all based on broad general coverage of the engineering sciences, the basic sciences including mathematics, the social sciences, and the humanities. The program is oriented toward the practical problems of the industrial world but adequate scientific depth is maintained so that graduates will be readily accepted into graduate programs in transportation.

CURRICULUM IN TRANSPORTATION ENGINEERING

Freshman	F	W	S
Transportation Fundamentals (TE 121)			2
Applied Descriptive Geometry (ET 141)	2		
Engineering Drawing Systems (ET 142)		2	
Engineering Problems—Digital Computers (Engr 251)			2
*Manufacturing Processes	2	1	1
Analytic Geometry and Calculus (Math 141, 142, 143)	4	4	4
General Chemistry (Chem 124, 125)	4	4	
General Physics (Phys 131)			4
Freshman Composition (Engl 104, 105 or 218)	3	3	
Introduction to American Literature (Engl 208)			4
Life Science elective		3	
Physical Education Activity	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
	<hr/> 15½	<hr/> 17½	<hr/> 17½
Sophomore			
Strength of Materials (Aero 207)			5
Engineering Mechanics (ME 211, 212)	3	4	
Strength of Materials Laboratory (Aero 229)			1
Engineering Surveying (AE 237, 238, 239)	2	2	2
Analytic Geometry and Calculus (Math 241)	4		
Differential Equations (Math 242)		4	
Statistical Analysis (Stat 321)			3
General Physics (Phys 132, 133)	4	4	
Principles of Economics (Ec 211)	3		
Introduction to Urban Environment (CRP 211)		3	
American Democracy and World Affairs (Hist 206)			5
Physical Education Activity	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
	<hr/> 16½	<hr/> 17½	<hr/> 16½

* Select from MP 141, 142, 143, 144; IE 141; Weld 141, 142, 144.

Transportation Engineering

Junior	F	W	S
Transportation Materials (TE 329).....			3
Introduction to Traffic Problems and Transportation (TE 321).....		4	
Operations Research (IE 304).....	3		
Structural Analysis (TE 322, 323).....	3	3	
Fluid Mechanics (ME 341).....	3		
Soil Mechanics and Foundations (ArcE 421).....			3
Materials Engineering Laboratory (Met 341).....		1	
Thermodynamics (ME 302).....			3
Reinforced Concrete Structures (ArcE 406).....		3	
Materials Engineering (Met 306).....		3	
Physical Geology (Geol 201).....		3	
Statistical Analysis (Stat 322).....	3		
American Government (Pol Sc 201).....	3		
**Literature or Philosophy.....			3
Elective.....			4
	15	17	16
Senior			
Highway & Airfield Pavement Design (TE 421).....	4		
Geometric Design of Highways (TE 422).....	4		
Structural Steel Design (TE 423).....		4	
Transportation Systems Planning (TE 433).....			4
Senior Project (TE 461, 462).....		2	2
Undergraduate Seminar (TE 463).....			2
Engineering Economy (IE 403).....		3	
Environmental Air Quality (EnvE 325).....	3		
Electric Circuit Theory (EE 201).....	4		
Electronics (EL 321).....		4	
Human Values in Engineering (Hum 402).....			3
**Humanities.....	3		
Urban Sociology (Soc 313).....			3
Electives.....		3	3
	18	16	17

** To be selected in accordance with the General Education requirement.



SCHOOL OF HUMAN DEVELOPMENT AND EDUCATION



SCHOOL OF HUMAN DEVELOPMENT AND EDUCATION

Carl C. Cummins, Dean

John B. Connely, Associate Dean

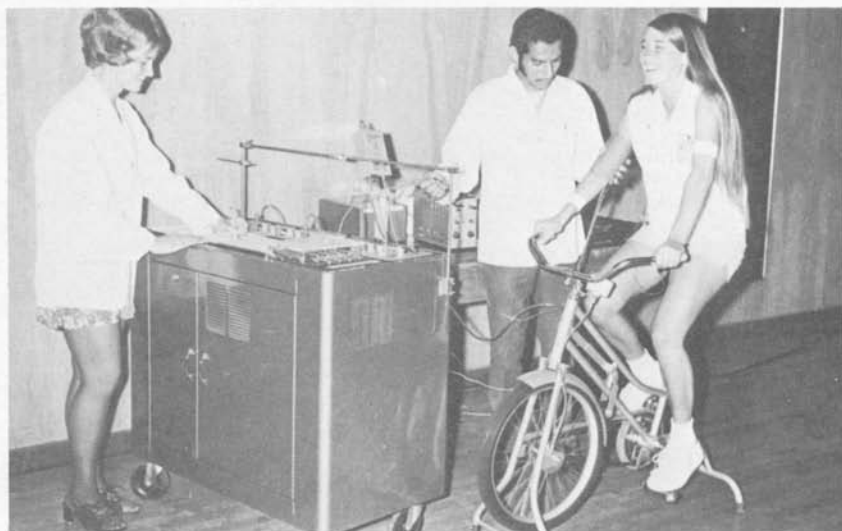
The School of Human Development and Education offers several major curricula leading to Bachelor of Science, Master of Arts, and Master of Science degrees. In addition, each department provides courses which are designed to serve all other departments in the University in offering experiences to students that enhance their general education.

Departments offering a major are Child Development, Home Economics and Physical Education. The Ethnic Studies Department and the Psychology Department offer a wide range of electives for students majoring in other fields. Master's degrees are offered in Education, Home Economics, and Physical Education.

The School, through the Education Department, assists in the coordination of a campus-wide teacher education program and prepares individuals who are seeking credentials. The University is accredited to recommend for the Standard Teaching Credential with a specialization in Elementary Teaching, the Standard Teaching Credential with a Specialization in Secondary Teaching, the Standard Designated Services Credential with a specialization in pupil personnel services in the area of counseling, and the Standard Supervision Credential with specialization in elementary supervision, secondary supervision, elementary principalship, and secondary principalship. A program for preparing elementary teachers under the Ryan Act is also available.

The School has taken the leadership in the sponsorship or direction of numerous community oriented projects which are timed to meet social needs in cooperation with local, state and federal agencies. Such projects include the High School Equivalency Program, Teaching Internship for Migrant Education, Professional Development in Work Experience Education, and others.

The University supports a strong co-curricular program, and to this end the School of Human Development and Education provides valuable experience in intramural sports activities. Specialized co-curricular activities include: California Association for Health, Physical Education and Recreation, Student California Teachers Association, Phi Upsilon Omicron (Home Economics), and others.



CHILD DEVELOPMENT DEPARTMENT

Department Head, Margaret E. McGeever

Robert A. Christenson
Roy H. Marlowe
Winifred Reynolds
Josephine Stearns

Teresa Stoneback
Suzanne L. Volin
Angli Wai

The subject matter of the curriculum in the Child Development Department is the total span of child development and the interaction of family members. The objectives of the department are to contribute to the interpersonal competence of men and women, and to provide pre-professional training for careers in service to children, adolescents, adults, and families.

The curriculum provides course work in anthropology, psychology, sociology, art, music, child development, and in the principles of program planning and administration. A nursery school laboratory on the campus and day care centers and nursery schools in the community provide students the opportunity to work with children.

CURRICULAR CONCENTRATIONS

Nursery School Teaching

The concentration in Nursery School Teaching is planned to prepare students interested in becoming teachers and administrators for the nursery schools and children centers. This curriculum is also designed for the student interested in pursuing an elementary teaching credential. The major in child development is excellent background preparation for teaching in the public schools.

Child and Family Services

The concentration in Child and Family Services is an interdisciplinary program designed to provide the knowledge and experience leading to a professional career in a variety of family, community, and volunteer agencies. This program is particularly appropriate for the student who is interested in working with child related programs such as Head Start, Family Counseling Centers and adoption. It also provides a wide variety of course work to prepare a person for public service.

CURRICULUM IN CHILD DEVELOPMENT

Freshman	F	W	S
Dating, Courtship, and Marriage (CD 103)			3
The Child, Family, and Community (CD 108)			3
Orientation to Art Materials (Art 232)		3	
Orientation to Crafts (Art 233)			3
Music Theory (Mu 101)	3		
Freshman Composition (Engl 104, 105)	3	3	
Introduction to Sociology (Soc 105)		3	
General Inorganic Chemistry (Chem 121, 122)		4	4
Health Education (PE 250)	2		
Physical Education Activity	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Mathematics for General Education (Math 100)	3		
Electives	4	3	3
	15½	16½	16½

Child Development

Sophomore	F	W	S
Nutrition (HE 210)		3	
Family Development (CD 203)	3		
Child Development—Infancy (CD 232)		3	
Child Development—Preschool Years (CD 233)			3
Early Children's Literature (Engl 205)			3
Music for Children (Mu 301)	3		
Cultural Anthropology (Ant 201)	3		
Organic Chemistry (Chem 226)	4		
General Psychology (Psy 202)		3	
Survey of Economics (Ec 201)			3
Principles of Speech (Sp 200)			3
American Government (Pol Sc 201)		3	
Natural History (Bio 127, 128, 129)	3	3	3
Physical Education Activity	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Electives	1		2
	17½	15½	17½
Junior			
Family and Community Health (CD 322)	3		
Advanced Composition (Engl 300)			3
Growth of American Democracy (Hist 204)		3	
U.S. in World Affairs (Hist 205)			3
Genetics (Bio 303)	3		
General Zoology (Zoo 131)		4	
Maternal and Child Nutrition (HE 310)			3
Personality and Mental Health (Psy 301)	3		
Social Problems (Soc 106)		3	
Social Stratification (Soc 323)			3
*Philosophy	3		
†Electives and courses to complete major	5	6	4
	17	16	16
Senior			
*Literature	3		
Urban Sociology (Soc 313)	3		
Social Psychology (Psy 401)		3	
Parent-Child Relationship (CD 413)			3
Senior Project (CD 461, 462)	2	2	
Undergraduate Seminar (CD 463)			2
†Electives and courses to complete major	9	12	11
	17	17	16

See COURSES OF INSTRUCTION section of this catalog for description of courses in Child Development, Home Economics and other subjects.

* To be selected in accordance with the General Education requirement.

† 29 of the elective units in the junior and senior years must be chosen with the approval of the advisor in a field of concentration.

EDUCATION DEPARTMENT

Department Head, Walter P. Schroeder

William W. Armentrout	Edward J. Ernatt	Alice E. Roberts
Ann S. Bouie	Homer E. Hoyt	Richard M. Sanchez
James J. Bowen	Jack B. Jones	Harry H. Scales
Marjorie Cass	Richard V. Jones	Bernard A. Troy
Ralph C. Collins	James A. Langford	J. Barron Wiley
John E. Connely	Robert L. Levison	Irwin A. Willson
Erland G. Dettloff	Louis D. Pippin	Malcolm W. Wilson
Robert W. Dickinson		

The Education Department staff, in addition to teaching professional courses, advises fifth-year and graduate students who are working toward initial and advanced credentials. Persons preparing to teach in the elementary school should refer to the program in Liberal Studies.

Those preparing to teach in the secondary school may earn majors in: Agricultural Science, Biological Sciences, Chemistry, English, Graphic Communications, History, Home Economics, Industrial Arts, Journalism, Mathematics, Physical Education, Physical Sciences, Physics, Political Science, Social Sciences, and Speech Communication. Because of changes in teacher preparation requirements in the state, students should consult with the Coordinator of Secondary Education regarding appropriate degree programs.

The Education Department offers the Masters' Degree in Education; professional courses in Elementary School Teaching, Secondary School Teaching, School Supervision (including elementary and secondary principalships), and Pupil Personnel Services.

Special emphasis is placed on the preparation of persons to teach vocational subjects in the schools including advisement for the Bachelor of Vocational Education Degree. Instruction is also given in some administrative and supervisory phases of vocational education.

Instructors in many departments at California Polytechnic State University help students develop competence in the subject to be taught and the methods of teaching. Each candidate for teaching is prepared to be a professional staff member in a public school. An institutional approach to teacher education is strengthened through the Coordinating Committee for Teacher Education composed of faculty members in the major, minor and the education departments who provide over-all planning and direction for the teacher education program. Good relationships with community and school personnel enable teaching candidates to engage in a variety of experiences needed to become successful instructors.

The Education Department provides coordination for the following teacher credential programs which are accredited by the State Board of Education.

Standard Teaching Credential—Elementary Specialization

Standard Teaching Credential—Secondary Specialization

Standard Designated Services Credential—Counseling, Psychometry Internship

Standard Supervision Credential—Supervision and Principalship, Elementary and Secondary

Portions of the California Teacher Preparation and Licensing Law of 1970 (Ryan) becoming effective January 1, 1973, may require changes in programs and courses from those presently listed in this catalog. A supplement containing these necessary course changes and credential requirements may be obtained from the Education Department.

Education

CURRICULUM FOR THE MASTER OF ARTS DEGREE IN EDUCATION

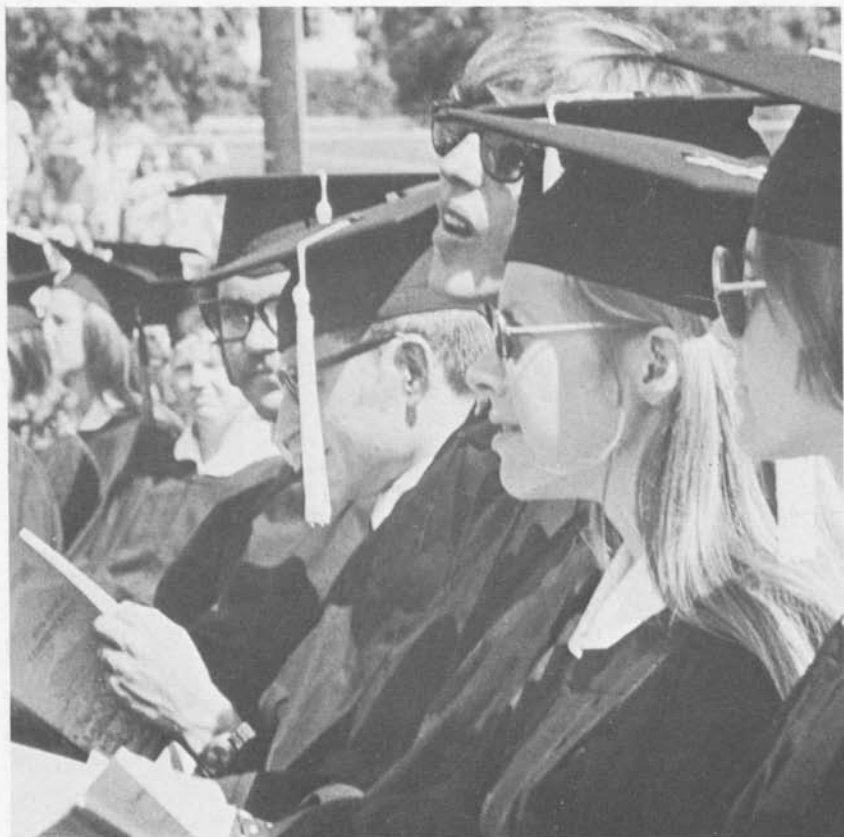
Candidates may, on advisement, pursue programs leading to several specializations designed to meet the specialized needs of individual students.

The specializations available are Counseling and Guidance, Curriculum and Instruction, Physical Sciences, School Supervision, and Social Sciences. All programs require 45 quarter units of acceptable graduate work with a minimum of 24 units of 500 series courses.

Programs with specializations in the student's teaching major (Physical Sciences or Social Sciences) must include a minimum of 18 units of acceptable course work in the subject field of specialization (12 units of which must be in 500 series courses), and a minimum of 12 units of 500 series course work in Education.

Programs with a specialization in Curriculum and Instruction, Counseling and Guidance, or School Supervision must include a minimum of 24 units of 500 series course work in Education, and a minimum of 12 units of course work acceptable for graduate credit outside the field of education. See *Graduate Study Bulletin* for further details.

See **COURSES OF INSTRUCTION** section of this catalog for descriptions of courses in Education and other subjects.



ETHNIC STUDIES DEPARTMENT

Department Head, David J. Sanchez

The University presently offers in several departments a number of courses which are classified as ethnic studies designed to facilitate the study of various cultures and subcultures, their origins, development, contributions, and changing characteristics. The underlying premise is that in studying the society and culture of a people, a combination of several disciplines can be utilized to produce comparative insights and a more comprehensive knowledge. Although a major is not offered in ethnic studies, a proper selection of courses from this area may provide a concentration of units acceptable for a teaching minor in ethnic studies. The courses can be used to supplement the requirements for many degree programs, and some will satisfy the general education-breadth requirement.

The following courses are typical of those available in ethnic studies and students are referred to the current class schedule for cultures or areas to be emphasized within the courses in a given quarter.

INTERDISCIPLINARY COURSE OFFERINGS

Anthropology

Ant 201 Cultural Anthropology (3)

Architecture

Arch 301, 302 History of Non-Western Architecture (3) (3)

Art

Art 314 American Art (2)

Art 316 Non-Western Art (2)

Child Development

CD 301 Afro-American Pre-School Child (3)

CD 302 Mexican-American Pre-School Child (3)

Economics

Ec 325 Underdevelopment and Economic Growth (3)

Education

Ed 315 Contemporary Education of the Afro-American (3)

Ed 402 Minority Student Counseling and Guidance (3)

Ed 414 Teaching Reading to Bilingual Students (3)

Ed 416 Contemporary Education of the Chicano (3)

Ed 521 Teaching the Culturally Different Child (3)

English

Engl 124, 125, 126 Intensive Composition (3) (3) (3)

Engl 214 Afro-American Literature (4)

Engl 215 Mexican-American Literature (4)

Engl 414 Significant World Writers (4)

Engl 418 Significant American Writers (4)

Engl 504 Problems in Language (3)

Engl 522 Teaching English as a Second Language (3)

Ethnic Studies

Eth S 105 Introduction to Ethnic Studies (1)

Eth S 114 Racism in American Culture (3)

Foreign Language

ForL 101, 102, 103 Foreign Language—Independent Study (3) (3) (3)
(See course listing for specific languages)

Geography

Geog 401 Area Geography (3)

History

- Hist 112 History of California (3)
- Hist 307, 308, 309 Latin American History (3)
- Hist 321 Chicano History in the Southwest (3)
- Hist 325 Ethnic Groups in American History (4)
- Hist 331 Afro-American History (3)
- Hist 341 Mexican History (3)
- Hist 381, 382 African History (3)
- Hist 411, 412, 413 History of East Asia (3) (3) (3)

Music

- Mu 208 Ethnic Music of the World (3)
- Mu 306 Ethnic Music of the World II (3)

Philosophy

- Phil 302 World Religions (4)

Physical Education

- PE 131/174 Folk Dance (½)

Political Science

- Pol Sc 303 Minority Group Politics (3)
- Pol Sc 311 Inter-American Relations (3)
- Pol Sc 313 International Politics (3)
- Pol Sc 402 Politics and Governments of Developing Areas (3)
- Pol Sc 465 Contemporary Problems and Institutions of the Middle East and Africa (3)
- Pol Sc 468 Contemporary Problems and Institutions of Africa South of the Sahara (3)

Sociology

- Soc 303 Social Problems (3)
- Soc 313 Urban Sociology (3)
- Soc 315 Race Relations (3)
- Soc 316 American Minorities (3)
- Soc 323 Social Stratification (3)
- Soc 344 Sociology of Poverty (3)



HOME ECONOMICS DEPARTMENT

Department Head, Ruth H. James

Connie Breazeale
Sarah E. Burroughs
Grace J. Burtis
Kathleen D. Friend

Lezlie A. Labhard
Karen S. Moerman
Krishnakumar S. Morey
Mildred E. Roske

Patricia Saam
Ellen T. Stookey
Gretchen C. Streichert
Barbara P. Weber

The principal objectives of the Home Economics Department are to provide educational preparation for: (1) teachers of home economics in the secondary schools, (2) managers and dieticians in food service programs. In addition, persons with a more general interest in home economics will find the curricula prepare for other occupational pursuits and provide a sound basis for successful family and personal life. Students are invited to consult with the department concerning their special interests in the field of home economics.

In addition to providing general education courses, the curricula place considerable emphasis upon applied courses during the first two years and provide other courses basic to the advanced work in the later years.

The Home Economics Department offers two related bachelor of science degree programs: Dietetics-Food Administration and Home Economics. A graduate program leading to the Master of Science in Home Economics also is offered.

Dietetics-Food Administration

This degree program provides the educational background for management of institutional and commercial food service programs. Membership in the American Dietetic Association is available to graduates following a one-year internship. In their junior year students concentrate in therapeutic or administrative dietetics or in business administration.

Home Economics

This degree program is designed to give a foundation in all areas of home economics. Careful choice of electives with the help of an adviser will provide preparation for professional home economics positions.

In addition to the required courses, students preparing to teach home economics are required to complete credential requirements specified by the Home Economics and Education Departments.

CURRICULUM IN DIETETICS-FOOD ADMINISTRATION

Freshman	F	W	S
Introduction to Foods (HE 121).....		5	
Design Analysis for Home Economics (HE 122).....	2		
Dating, Courtship, and Marriage (CD 103).....			3
General Inorganic Chemistry (Chem 121, 122).....	4	4	
English Composition (Engl 114, 115).....		4	4
Mathematics (Math 100, 110, 113).....	3		
Physical Education Activity.....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Health Education (PE 250).....	2		
Art.....			3
Principles of Accounting (Actg 221, 222).....		4	4
Electives.....	4		3
	<hr/> 15½	<hr/> 17½	<hr/> 17½

Home Economics

Sophomore	F	W	S
Personal Home and Management (HE 203).....			3
Problems of Family Housing (HE 207).....	3		
Nutrition (HE 210).....		3	
Home Food Conservation (HE 226).....	2		
Meat Procurement and Use (FI 209).....		3	
Elementary Probability and Statistics (Stat 211).....			3
General Zoology (Zoo 131).....		4	
Organic Chemistry (Chem 226).....	4		
General Bacteriology (Bact 221).....			4
Purchasing (Mgt 206).....	3		
General Psychology (Psy 202).....			3
Principles of Speech (Sp 200).....		3	
Physical Education Activity.....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Electives	4	3	3
	<hr/> 16½	<hr/> 16½	<hr/> 16½
Junior			
Maternal and Child Nutrition (HE 310).....			3
Meal Management (HE 321).....	3		
Advanced Nutrition (HE 328).....		3	
Advanced Nutrition Laboratory (HE 348).....		2	
Human Anatomy and Physiology (Zoo 337, 338, 339).....	3	3	3
Biochemistry (Chem 328).....	4		
Psychology of Business and Industry (Psy 302).....	3		
Educational Psychology (Ed 312).....		3	
Personnel Administration (IR 315).....			3
Literature elective			3
Electives	4	6	4
	<hr/> 17	<hr/> 17	<hr/> 16
Senior			
Community Nutrition (HE 410).....	3		
Methods of Teaching Nutrition (HE 415).....		3	
Meals for Special Occasions (HE 421).....			2
Quantity Cookery (HE 425).....	3		
Food Production Management (HE 426).....		3	
Equipment and Layout (HE 427)			3
Diet Therapy (HE 429).....	3		
Senior Project (HE 461, 462).....		2	2
Undergraduate Seminar (HE 463).....		2	
Food Microbiology (Bact 421).....	4		
Philosophy elective			3
American Government (Pol Sc 201).....	3		
Growth of American Democracy (Hist 204).....		3	
U.S. in World Affairs (Hist 205).....			3
Electives		3	3
	<hr/> 16	<hr/> 16	<hr/> 16

CURRICULUM IN HOME ECONOMICS

Freshman	F	W	S
Dating, Courtship, and Marriage (CD 103)		3	
Introduction to Foods (HE 121)	5		
Design Analysis for Home Economics (HE 122)		2	
Clothing Construction (HE 131)			3
Freshman Composition (Engl 104, 105)	3	3	
Physical Education Activity	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Mathematics (Math 110, 113, or Stat 211)	3		
* Art	3		
Health Education (PE 250)			2
Introduction to Sociology (Soc 105)			3
General Inorganic Chemistry (Chem 121, 122)		4	4
Electives	2	3	5
	<hr/> 16 $\frac{1}{2}$	<hr/> 15 $\frac{1}{2}$	<hr/> 17 $\frac{1}{2}$
Sophomore			
Personal and Home Management (HE 203)	3		
Problems of Family Housing (HE 207)		3	
Nutrition (HE 210)			3
Child Development—Preschool Years (CD 233)		3	
Interior Design (HE 242)			4
Cultural Anthropology (Ant 201)	3		
General Psychology (Psy 202)		3	
Organic Chemistry (Chem 226)	4		
General Bacteriology (Bact 221)		4	
Principles of Speech (Sp 200)			3
Physical Education Activity	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Survey of Economics (Ec 201)	3		
General Zoology (Zoo 131)			4
Electives	3	3	3
	<hr/> 16 $\frac{1}{2}$	<hr/> 16 $\frac{1}{2}$	<hr/> 17 $\frac{1}{2}$
Junior			
Maternal and Child Nutrition (HE 310)		3	
Meal Management (HE 321)	3		
Textiles (HE 322)	3		
Management of Consumer Resources (HE 324)			3
Demonstration Techniques (HE 326)		2	
Household Equipment (HE 331)			4
Advanced Composition (Engl 300)		3	
Dynamics of Clothing (HE 341)		3	
* Literature			3
Personality and Mental Health (Psy 301)	3		
Electives	8	6	6
	<hr/> 17	<hr/> 17	<hr/> 16
Senior			
Senior Project (HE 461, 462)	2	2	
Undergraduate Seminar (HE 463)			2
American Government (Pol Sc 201)	3		
Growth of American Democracy (Hist 204)		3	
U.S. in World Affairs (Hist 205)			3
* Philosophy	3		
Electives	8	11	11
	<hr/> 16	<hr/> 16	<hr/> 16

* To be selected in accordance with the General Education requirement.

Home Economics

CURRICULUM FOR THE MASTER OF SCIENCE DEGREE

(For University requirements see the *Graduate Study Bulletin*)

Required	Units
HE 511 Research Design	3
HE 580 or 582 Graduate Seminar.....	3
HE 599 Thesis or additional approved course work and comprehensive examination	6
Courses in the general field of Home Economics selected from 500 series level.....	12
Courses in major area(s) of interest selected from 400 and 500 series level.....	12
Electives selected from 400 and 500 series level	9
	45

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Home Economics and other subjects.



LIBERAL STUDIES

Interdisciplinary Program
Coordinator, Allen D. Miller

The Bachelor of Arts in Liberal Studies is a degree major designed primarily to provide the undergraduate preparation for the student who intends ultimately to satisfy requirements for a teaching credential authorizing multiple subject instruction; i.e., elementary school teaching. The total degree requirement of 186 quarter units is distributed as follows: 126 units of subject matter coursework to meet credential regulations in the areas of Mathematics and Science, English and Speech, Humanities and Fine Arts, Social Sciences; 15 additional units to complete general education breadth requirements; 36 units of professional education including student teaching; and 9 units of free electives.

The liberal studies major may also be elected by the student who does not have teaching as a career goal but wishes to extend the breadth of undergraduate study more extensively in academic areas than is possible under a single subject degree major. For the non-teaching oriented student, curricular requirements differ from those of the prospective teacher in that the 36 quarter units will be distributed as follows: 6 units of senior project and undergraduate seminar, 12 units of foreign language, and 18 units selected from academic areas approved by the adviser.

CURRICULUM IN LIBERAL STUDIES

Freshman

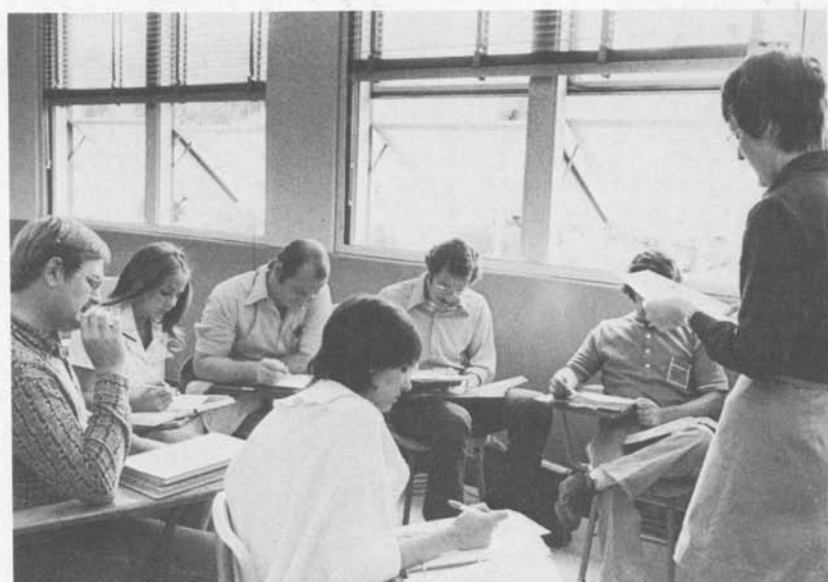
	<i>Units</i>
Mathematics for General Education (Math 100) or	
College Algebra (Math 114).....	3
Introduction to Sociology (Soc 105).....	3
Natural History (Bio 127, 128, 129).....	9
Physical Education Activity.....	1
The Physical Environment (PSc 101, 102) or	
General Inorganic Chemistry (Chem 121, 122).....	8
Introduction to the Solar System (Astr 101) or	
Physical Geology (Geol 201).....	3
Freshman Composition (Engl 104, 105).....	6
History of California (Hist 112).....	3
Music Theory (Mu 101).....	3
American Government (Pol Sc 201).....	3
Cultural Anthropology (Ant 201).....	3
Health Education (PE 250).....	2
Elective	3
	<hr/> 50

Sophomore

Children's Literature (Engl 205).....	3
Principles of Speech (Sp 200).....	3
Growth of American Democracy (Hist 204).....	3
General Psychology (Psy 202).....	3
The United States in World Affairs (Hist 205).....	3
Survey of Economics (Ec 201) or Principles of Economics (Ec 211).....	3
Introduction to Art (Art 231).....	3
Orientation to Art Materials (Art 232).....	3
Orientation to Crafts (Art 233).....	3
Appreciation (Mu 204) or Ethnic Music of the World (Mu 208).....	3
Contemporary Ideas (Hum 270).....	3
Children's Drama (Dr 347).....	3
Advanced Composition (Engl 300).....	3
Modern English Grammar (Engl 301).....	4
Introduction to Speech Correction (Sp 302) or	
Voice and Phonetics (Sp 306).....	4
Elective	3
	<hr/> 50

Liberal Studies

Junior	Units
Mathematics for Elementary Teachers (Math 327, 328, 329)	9
Music for Children (Mu 301)	3
Genetics (Bio 303)	3
Evolution (Bio 315)	2
American Literature (Engl 311, 312)	8
Significant Writers (Engl 414, 417, or 418)	4
Political Science, Sociology, History, Geography, Economics (one course in each from approved list)	15
Art, Music, Humanities, Philosophy, or Spanish (one course from approved list)	3
Elective	3
	<hr/> 50
Senior (Credential emphasis)	
Learning Processes (Ed 335X)	3
Diagnosis, Prescription, and Evaluation (Ed 436X)	2
Instructional Processes (Ed 438X)	3
Organizing and Teaching Multiple Subjects (Ed 424X)	3
Supervised School Experience (Ed 439)	2
Curriculum and Methods in Elementary School Reading (Ed 434)	2
Senior Project Practicum (Ed 451X)	3
Student Teaching (Ed 430X and Ed 440)	18
	<hr/> 36
Senior (Academic emphasis)	
Senior Project (Hum 461, 462)	4
Undergraduate Seminar (Hum 463)	2
Foreign language (one year of German, French or Spanish)	12
Selected academic courses (from approved list)	18
	<hr/> 36



PHYSICAL EDUCATION

MEN'S DEPARTMENT

Department Head, Robert A. Mott

Richard A. Anderson
Lynn J. Archibald
Andrew Brennan
Larry M. Bridges
Victor A. Buccola
F. Stuart Chestnut
John H. Crivello
David W. Grosz

F. Sheldon Harden
Richard R. Harper
Berdy V. Harr
Dwayne G. Head
Richard Heaton
William R. Hicks
Thomas L. Hinkle
Vaughan Hitchcock

James J. Jensen
Edward J. Jorgensen
Bobbie A. Lane
Thomas J. Lee
James D. Sanderson
Stevan M. Simmons
James L. Webb
Ernest J. Wheeler, Jr.

WOMEN'S DEPARTMENT

Department Head, Mary Lou White

Melva Irvin
Evelyn I. Pellaton

Barbara Sevier
Mary L. Stallard
Moon Ja Minn Suhr

The major function of the Physical Education Departments is to provide both required and elective courses in physical education and health to meet the general education needs of all students. To supplement this general education, the departments administer an extensive intramural sports program for all students of the college. A second function of the departments is to prepare both men and women as secondary teachers in the fields of physical education and health. It is possible to have a curricular concentration in the field of recreation. A total of 28 units with adviser's approval may be taken in this area.

Because of an ideal geographical location and outstanding physical education facilities, Cal Poly has become a center for workshops held by the health and physical education organizations of the State.

Extensive outdoor facilities include a number of turfed areas for physical education classes and intramural sports activities. A football stadium, regulation baseball diamond with permanent stands and quarter-mile track provide outstanding facilities for intercollegiate athletic teams. Basketball, volleyball, handball, shuffleboard, all-weather tennis courts and two competitive swimming pools are used for instruction and student recreation.

The Men's Physical Education building provides excellent facilities for all phases of the total physical education and intercollegiate athletic program. The main gymnasium has a championship basketball court and three intramural basketball courts. It also has a wrestling room, weight training area and a gymnastic room.

The women's program is centered in Crandall Gym which has adequate facilities for basketball, volleyball, badminton, gymnastics. A dance studio, pool, and an adaptive physical education laboratory are located in this area. A new Women's Physical Education complex is in design and will be constructed west of the Men's Physical Education facility.

CURRICULUM IN PHYSICAL EDUCATION (MEN)

Freshman	F	W	S
Freshman Composition (Engl 104, 105)	3	3	
Mathematics (Math 114, 115)	3	3	
Health Education (PE 250)			2
Professional Activity Series (PE 230-239)	1	1	1
Community Recreation (PE 260)			3
The Physical Environment (PSc 101, 102)		4	4
General Zoology (Zoo 131, 132)	4	4	
Introduction to Physical Education (PE 270)	2		
School Health Program (PE 254)			2
Electives	3	1	4
	16	16	16

Physical Education

Sophomore	F	W	S
Elementary Probability & Statistics (Stat 211)	3		
Social sciences elective		3	
General Psychology (Psy 202)		3	
Techniques of Officiating (PE 278)			3
Principles of Speech (Sp 200)			3
Professional Activity Series (PE 230-239)	1	1	1
Human Anatomy (Zoo 337)	3		
Human Physiology (Zoo 338, 339)		3	3
Human Muscle Anatomy (Zoo 340)			2
History and Philosophy of Physical Ed (PE 274)	3		
American Government (Pol Sc 201)		3	
Literature, Philosophy, Art	3	3	3
Safety and First Aid (PE 280)			2
Electives	3	1	
	16	17	17
Junior			
Introduction to Dance (PE 334)		3	
Apparatus and Gymnastics (PE 355)	2		
Growth of American Democracy (Hist 204)	3		
Educational Psychology (Ed 312)		3	
Football Coaching Theory (PE 321)			2
Track-Field Coaching (PE 333)			2
Baseball Coaching (PE 323)	2		
Physiology of Exercise (PE 303)			3
Intramural Sports (PE 331)			3
Kinesiology (PE 302)		3	
Wrestling Theory (PE 327)		2	
Swimming and Water Sports (PE 311)	2		
Tests and Measurements (PE 319)	3		
Human Development (Ed 304)			3
Advanced Composition (Engl 300)		3	
Electives	4	3	3
	16	17	16
Senior			
Senior Project (PE 461, 462)	2	2	
U.S. in World Affairs (Hist 205)	3		
Basketball Theory (PE 422)		2	
Physical Education Activity (PE 440)	1	1	1
Organization and Administration of Health and Physical Education (PE 401)	3		
Athletic Training and Massage (PE 432)		2	
Adaptive Physical Education (PE 406)			3
Electives	8	10	13
	17	17	17

CURRICULUM IN PHYSICAL EDUCATION (WOMEN)

Freshman			
Freshman Composition (Engl 104, 105)	3	3	
Mathematics (Math 114, 115)	3	3	
Health Education (PE 250)			2
Physical Education General Activity	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Professional Activity Series (PE 240-249)	1	1	1
The Physical Environment (PSc 101, 102)		4	4
General Zoology (Zoo 131, 132)	4	4	
Introduction to Physical Education (PE 270)	2		
School Health Program (PE 254)			2
Community Recreation (PE 260)			3
Electives	3	1	4
	16 $\frac{1}{2}$	16 $\frac{1}{2}$	16 $\frac{1}{2}$

Physical Education

	F	W	S
Sophomore			
Elementary Probability and Statistics (Stat 211)	3		
Social Sciences elective			3
General Psychology (Psy 202)		3	
American Government (Pol Sc 201)	3		
Principles of Speech (Sp 200)			3
General Activities	½	½	½
Professional Activity Series (PE 240-249)	1	1	1
Human Anatomy (Zoo 337)	3		
Human Physiology (Zoo 338)		3	
History and Philosophy of Physical Education (PE 274)	3		
Safety and First Aid (PE 280)			2
Growth of Democracy (Hist 204)		3	
U.S. in World Affairs (Hist 205)			3
Organization and Planning Techniques (PE 296)		3	
Electives	3	3	4
	16½	16½	16½
Junior			
Educational Psychology (Ed 312)		3	
Human Physiology (Zoo 339)	3		
Human Muscle Anatomy (Zoo 340)		2	
Kinesiology (PE 302)			3
Advanced Composition (Engl 300)		3	
Tests and Measurements (PE 319)	3		
Human Development (Ed 304)			3
Introduction to Dance (PE 334)		3	
Approved professional electives	3	5	5
Intramural Sports (PE 331)	3		
Literature, Philosophy, Art	3		3
Electives	2		3
	17	16	17
Senior			
Senior Project (PE 461, 462)	2	2	
Physical Education Activity (PE 440)	1	1	1
Organization and Administration of Health and Physical Education (PE 401)	3		
Physiology of Exercise (PE 303)	3		
Adaptive Physical Education (PE 406)			3
Recreational Dance Theory (PE 381)	3		
Modern Dance Theory (PE 383)		3	
Literature, Philosophy, Art		3	
Electives	5	7	12
	17	16	16

CURRICULUM FOR THE MASTER OF SCIENCE DEGREE

(For University requirements see the *Graduate Study Bulletin*)

Required:		Units
PE 502	Advanced Seminar in Problems	3
PE 517	Research Methods	3
PE 521	Curriculum and Methods	3
PE 525	Motor Learning	3
		12

Physical Education

Select 6 units with adviser approval from the following:

PE 512	Critical Health Issues.....	3
PE 513	Evaluation of Current Studies.....	3
PE 522	Mechanical Analysis of Sport.....	3
PE 523	Administration of Co-Curricular Activities.....	3
PE 530	Advanced Physiology of Exercise.....	3

6

Additional Physical Education electives:

A minimum of twelve (12) additional graduate level units must be taken in Physical Education.

12

Electives:

A maximum of fifteen (15) units may be taken outside of the Physical Education Department in 300, 400, and 500 level courses. Up to twelve (12) units may be taken at the 300, 400 level.

15

45

For more detailed information or advisement, students should communicate with the Coordinator of Graduate Studies for Physical Education.

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Physical Education and other subjects.

PSYCHOLOGY DEPARTMENT

Department Head, L. Robert Sorensen

William D. Curtis
M. Dale Federer

Larry V. Hutchison
Peter M. Litchfield

Linden L. Nelson
Peter Rabe

The Psychology program is designed to acquaint students with the facts, theories, and contemporary trends in psychology. The application of psychological principles to existing personal, social, and technological problems, is emphasized throughout the departmental courses. Attention is placed upon individual student development of a more coherent and meaningful understanding of himself and of his interactions with others and with his environment.

The Psychology Department contributes to the overall academic community through its participation in the general education program, as a source of electives for the various major areas, and as a resource for increased self-awareness and development.



SCHOOL OF SCIENCE AND MATHEMATICS





SCHOOL OF SCIENCE AND MATHEMATICS

Clyde P. Fisher, Dean
Philip S. Bailey, Associate Dean

The School of Science and Mathematics offers curricula leading to the Bachelor of Science degree in Biochemistry, Biological Sciences, Chemistry, Computer Science, Mathematics, Physics, and Statistics. Graduate programs are offered leading to the Master of Arts degree in Mathematics and the Master of Science degree in Biological Sciences, Chemistry, Computer Science, and Applied Mathematics. The Reserve Officer Training Corps (ROTC) program is made available to all male students of the college through the Military Science Department.

Courses offered by the School of Science and Mathematics meet the needs of several groups of students:

1. Students working toward Bachelor of Science, Master of Arts, or Master of Science degrees with majors in science and mathematics.
2. Students from all majors who need to meet the requirements in General Education. These courses are required so that every graduate will be better prepared to be a participating citizen and a productive member of the State, nation, and world.
3. Students in Agriculture and Natural Resources, Architecture and Environmental Design, Business and Social Sciences, Communicative Arts and Humanities, Engineering and Technology, Human Development and Education, and Science and Mathematics who require competency in subjects which support, complement, or are closely related to their areas of specialization.
4. Students planning to become elementary, secondary, or community college teachers, who need background in science and mathematics.

The School of Science and Mathematics and the School of Human Development and Education cooperate to recommend candidates for the California Standard Teaching Credential with majors in Biological Sciences, Chemistry, Mathematics, and Physics. Teaching minors are offered in Botany, Chemistry, Computer Science, Mathematics, Physics, and Zoology. Students may concentrate in Physical Sciences as a part of the requirements for the Master of Arts in Education degree.



BIOLOGICAL SCIENCES DEPARTMENT

Department Head, Richard F. Nelson

Frederick P. Andoli	Randolph L. Grayson	Richard A. Pimentel
Paraschos Babos	V. L. Holland	Thomas L. Richards
James P. Bacon, Jr.	Dennis N. Homan	Rhonda L. Riggins
James S. Booth	C. Dennis Hynes	Ronald L. Ritschard
Robert J. Brown	Eric V. Johnson	Robert J. Rodin
Tracey G. Call	Richard J. Krejsa	Aryan I. Roest
Fred L. Clogston	George W. La Bar	Shirley R. Sparling
Jaime S. Colomé	Kingston L. Leong	William D. Stansfield
Alan F. Cooper	Georgiana Mason	John W. Thomas
Douglas D. Donaldson	David H. Montgomery	David H. Thomson
Harry L. Fierstine	Maria E. Ortiz	William Thurmond
Harry C. Finch	Pratapsinha C. Pendse	Dirk R. Walters
Dennis F. Frey	Elizabeth K. Perryman	Archie Waterbury
David V. Grady		

The department offers a complete undergraduate program leading to the Bachelor of Science degree. Students majoring in the department may concentrate interests in bacteriology, botany, entomology, zoology and other areas. Courses are offered to fulfill the biology requirements of other departments. For superior students a graduate program is offered leading to the Master of Science degree.

After earning a degree, students generally enter fields such as teaching, medical and biological laboratory technology, public health, wildlife management, agriculture, private, state and national park and forest services. A significant number of students also enter graduate or professional schools for advanced study of botany, entomology, microbiology, plant pathology, zoology, marine sciences, veterinary science, medicine, and dentistry.

Students are trained using modern facilities and instruments in a geographical area offering unusual opportunities for the study of a wide variety of plants and animals representative of both Northern and Southern California.

Courses designed for graduate students are numbered in the 500 series. Requirements for admission as a graduate student are given in the section on ADMISSIONS of this catalog. In addition, a candidate must provide test results of the Graduate Record Examination aptitude test and the advanced test in biology. Details of the curriculum for each student will be developed with his graduate committee and adviser. See also the Graduate Studies Bulletin.

In addition to the curricular concentrations listed below, the department offers the courses required for preprofessional training in medicine and the paramedical fields. In the teaching area, all the state requirements may be met for an academic major in biological sciences leading to credentials in secondary and in elementary teaching.

CURRICULAR CONCENTRATIONS

Applied Field Biology

This concentration is designed for students interested in wildlife management, fisheries, conservation, vertebrate pest control, and natural history.

Biology

The general biology program is designed for the student who wants the broadest possible training.

Botany

Plant structure, physiology, ecology, diseases and classification are the basis for courses leading to competency required for persons desiring positions as botanists.

Marine Biology

Students in this concentration may look forward to occupational and professional work in the rapidly expanding field of oceanographic studies and enterprises.

Medical Laboratory Technology

Concentration in this area prepares the student for his in-service training in a hospital.

Microbiology

This concentration is designed for students interested in bacterial and other microbiological aspects of food preservation, pollution or public health.

Plant Pathology-Entomology

Students are trained to recognize, evaluate and solve plant disease and insect problems. They may be employed as technicians in research or extension service, or may continue their studies at the graduate level.

Zoology

Invertebrate or vertebrate animals, terrestrial or aquatic species, macro or micro studies, form the basis of programs involved in the training of zoologists.

CURRICULUM IN BIOLOGICAL SCIENCES

Freshman	F	W	S
General Botany (Bot 121, 122, 123) or General Zoology.....	4	4	4
¹ General Inorganic Chemistry (Chem 121, 122, 126).....	4	4	4
Organic Chemistry (Chem 226).....			4
English Composition (Engl 114, 115).....		4	4
² College Algebra and Trigonometry (Math 117).....	5		
* Physical Education	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
** Electives and courses to complete major.....	3	4	
	16 $\frac{1}{2}$	16 $\frac{1}{2}$	16 $\frac{1}{2}$
Sophomore			
General Zoology (Zoo 131, 132, 133) or General Botany	4	4	4
General Bacteriology (Bact 221)	4		
General Entomology (Ent 126)			4
College Physics (Phys 121, 122, 123)	4	4	4
* Social Sciences (not History).....	3	3	3
* Physical Education	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
** Electives and courses to complete major.....	1	5	1
	16 $\frac{1}{2}$	16 $\frac{1}{2}$	16 $\frac{1}{2}$
Junior			
Ecology (Bio 325)	3		
Genetics (Bio 303)	3		
Advanced Composition (Engl 218 or 300).....		3	
American Government (Pol Sc 201).....	3		
* Literature or Philosophy	3	3	
* Humanities			3
Senior Project (Bio 461)			2
Biochemistry (Chem 328)		4	
Principles of Speech (Sp 200).....			3
** Electives and courses to complete major.....	5	7	9
	17	17	17
Senior			
General Physiology (Bio 431)	4		
Senior Project (Bio 462)		2	
Undergraduate Seminar (Bio 463)			2
General Cytology (Bio 423)			4
Growth of American Democracy (Hist 204).....		3	
U.S. in World Affairs (Hist 205).....			3
** Electives and courses to complete major.....	12	11	7
	16	16	16

* To be selected in accordance with the General Education requirement.

** Of the total elective units 18-29 shall be chosen in a field of concentration in the Biological Sciences with the approval of the adviser. At least 10 of these must be in 300 or 400 courses.

¹ Chem 124, 125 will substitute for Chem 121 and 122.

² Math 114-115 will substitute, or Math 141 and any additional course in CSc, Math, or Stat.

Biological Sciences

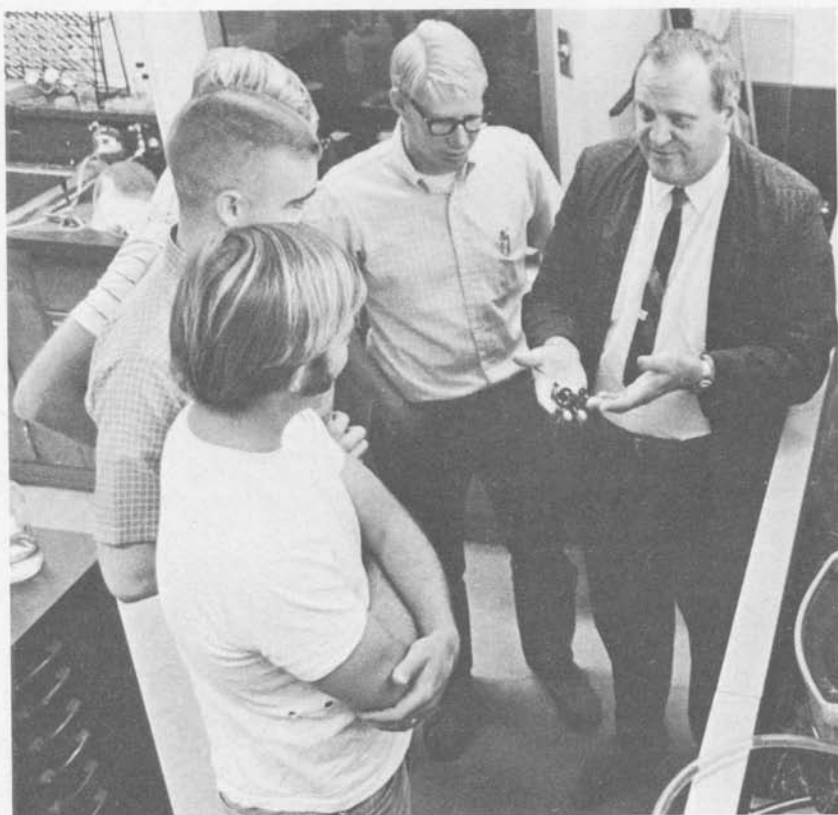
CURRICULUM FOR THE MASTER OF SCIENCE DEGREE

(For University requirements see the *Graduate Study Bulletin*)

	<i>Units</i>
Courses in the general field of biological sciences.....	12
Selected from 300, 400 and 500 level courses. Three units each must be selected from courses having any four of the following prefixes: Bact, Bio, Bot, Cons, Ent, Zoo.	
Courses in the major field of interest.....	15
Selected from 300, 400 and 500 level courses in the Biological Sciences Department.	
Seminar in Biology (Bio 590).....	3
Thesis (Bio 599) or additional course work with comprehensive examination.....	9
Electives from 300, 400 and 500 level courses.....	6
	<hr/> 45***

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Bacteriology, Biology, Botany, Conservation, Entomology, Zoology and other subjects.

*** At least 22½ of these units must be in 500 level courses, and all 45 units must be acceptable for graduate credit.



CHEMISTRY DEPARTMENT

Department Head, William C. Langworthy

Philip S. Bailey
Robert S. Cichowski
Alan W. Cobb
Lee Charles Coombs
Charles E. Dills
Norman L. Eatough
Leland S. Endres
Thomas G. Frey
Lewis B. Hawley

Jerome F. Houlis
James Katekaru
Martin Kellerman
Bruce Kennelly
Neil J. Moir
Albert E. Myers
James M. Peters
Russell L. Tice
Grant D. Venerable

Howard D. Walker
Harold J. Watson
James D. Westover
Omer K. Whipple
Hewitt G. Wight
David G. Williamson
Max T. Wills
Marshall S. Wright

The Chemistry Department serves all schools of the University by providing scientific background. The department also contributes to the general education of all students by giving them a thorough foundation in the method and factual content of chemical science and the role it plays in society. The chemistry and biochemistry curricula lead to the bachelor of science degree. Graduate work is offered leading to the master of science degree in chemistry.

Chemistry is the branch of science which deals with the composition and changes in composition of all substances. It is a description of the world at the atomic and molecular level. A science with a scope this broad offers many fields of specialization. Chemists analyze and synthesize such products as plastics, fibers, drugs, dyes and rocket fuels. The petroleum, textile, fertilizer, pharmaceutical, paint, paper and metal industries employ large numbers of chemists for quality control and development of new products. The occupational objectives of the curricula in chemistry are to qualify students for entry at the bachelor's level into positions in government service and industry and to help prepare teachers of the physical sciences. The curriculum in chemistry prepares the student to work at the bachelor's level as an organic, analytical, physical, or inorganic chemist. In addition, graduates have entered medical, dental, veterinary, pharmacy, medical technology, and graduate schools. Courses are taught in modern laboratories making use of the latest scientific instruments.

The Chemistry Department is fully approved and accredited by the American Chemical Society. Students who wish to be recommended for certification by the American Chemical Society must complete Ger 301 and 302, Scientific German or Russian (Lang 101 and 102, Foreign Language—Independent Study) and pass an examination demonstrating the ability to read scientific German or Russian. Use and application of German or Russian scientific literature is to be made in chemistry courses taken during the third and fourth year of the program and in the literature search for the Senior Project.

The master of science program is designed to develop professional competence for productive employment in industry, government and education. The student desiring to enter this program should complete an undergraduate major in chemistry or biochemistry with evidence of superior scholarship.

Graduate courses are offered which help to complete the requirements for the master of science degree in chemistry, for teaching credentials, and for the master of arts degree in education with a concentration in the physical sciences.

Proper selection of electives in the curriculum in biochemistry permits specialization in nutritional, food, feed, pesticide, fertilizer or clinical chemistry. Students find employment in the laboratories of those companies devoted to the processing of food products and the production of agricultural and pharmaceutical chemicals. Positions for which the student may qualify include vitamin assay biochemist, food and drug chemist, meat technologist, fertilizer chemist, insecticide residue analyst and public health chemist.

It is recommended that the high school student planning to major in chemistry or biochemistry include at least two semesters of chemistry in his high school program. Students enrolling in General Chemistry or General Inorganic Chemistry are required to pass Chem 106, or the equivalent, or have the recommendation of their faculty adviser.

CURRICULUM IN CHEMISTRY

Freshman	F	W	S
General Chemistry (Chem 121, 122, 126)	4	4	4
General Chemistry Laboratory (Chem 143)			1
Freshman Composition (Engl 104)	3		
Oral or written communication			3
Analytic Geometry and Calculus (Math 141, 142, 143 or 131, 132, 133)	4	4	4
† Physical Education	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Biological Sciences (Bio 101, Bot 121, or Zoo 131)		3	
Electives	4	4	3
	<hr/> 15 $\frac{1}{2}$	<hr/> 15 $\frac{1}{2}$	<hr/> 15 $\frac{1}{2}$
Sophomore			
Quantitative Analysis (Chem 331)	4		
Organic Chemistry (Chem 226)		4	
* Approved Chemistry elective		4	3
General Physics (Phys 131, 132, 133)	4	4	4
** Analytic Geometry and Calculus (Math 241)	4		
** Mathematics (Math 242)		4	
† Physical Education	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
† Social Sciences elective (not History)			3
Electives	3		5
	<hr/> 15 $\frac{1}{2}$	<hr/> 16 $\frac{1}{2}$	<hr/> 15 $\frac{1}{2}$
Junior			
Organic Chemistry (Chem 327, 338)	5	5	
Physical Chemistry (Chem 305, 306)		3	3
Physical Chemistry Laboratory (Chem 355, 356)		1	1
* Approved Chemistry elective			4
Physics elective			3
Literature	3		
American Government (Pol Sc 201)	3		
† Social Sciences elective (not History)		3	3
Electives	5	3	1
	<hr/> 16	<hr/> 15	<hr/> 15
Senior			
Physical Chemistry (Chem 437)	4		
Instrumental Analysis (Chem 439)	4		
Senior Project (Chem 461)	2		
Inorganic Chemistry (Chem 402)		3	
Undergraduate Seminar (Chem 463)			2
* Approved Chemistry elective		5	4
Growth of American Democracy (Hist 204)		3	
U.S. in World Affairs (Hist 205)			3
Literature or Philosophy	3		
Humanities elective			3
Electives	3	4	3
	<hr/> 16	<hr/> 15	<hr/> 15

* To be chosen from: Chem 313, 328, 332, 342, 343, 400, 403, 415, 416, 462, 470.

† To be selected in accordance with the General Education requirement.

** 8 units in Computer Science and/or Statistics courses may be substituted.

CURRICULUM IN BIOCHEMISTRY

	F	W	S
Freshman			
General Chemistry (Chem 121, 122, 126).....	4	4	4
Organic Chemistry (Chem 226).....			4
Freshman Composition (Engl 104).....	3		
Oral or written communication.....		3	
College Algebra and Trigonometry (Math 117).....	5		
Analytic Geometry and Calculus (Math 141 or 131).....		4	
Mathematics (Math 132, 142 or Stat 211).....			4
† Physical Education.....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Life science (Zoo 131 or Bot 121 or Bact 221).....		4	
Electives.....	3		3
	15½	15½	15½
Sophomore			
Quantitative Analysis (Chem 331).....	4		
Organic Chemistry (Chem 327).....		5	
Approved Chemistry elective.....			3
Biochemistry (Chem 328, 329).....		4	4
Physics (Phys 121, 122, 123 or 131, 132, 133).....	4	4	4
† Psychology.....	3		
† Social Sciences elective (not History).....			3
† Physical Education.....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Electives.....	3	2	2
	14½	15½	16½
Junior			
Biophysical Chemistry (Chem 351).....	4		
* Physical Chemistry (Chem 305, 306).....		3	3
* Physical Chemistry Laboratory (Chem 355, 356).....		1	1
Approved Chemistry elective.....	4		
American Government (Pol Sc 201).....			3
† Humanities elective.....	3		
† Literature or Philosophy.....		3	
Electives.....	5	8	9
	16	15	16
Senior			
Approved Chemistry elective (300 or 400 level).....		5	
Senior Project (Chem 461).....	2		
Undergraduate Seminar (Chem 463).....			2
† Literature or Philosophy.....	3		
Growth of American Democracy (Hist 204).....	3		
U.S. in World Affairs (Hist 205).....		3	
† Social Sciences elective (not History).....			3
Electives.....	7	7	11
	15	15	16

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Chemistry and other subjects.

CURRICULUM FOR MASTER OF SCIENCE DEGREE IN CHEMISTRY

(For University requirements see the Graduate Study Bulletin)

Required:	Units
Graduate courses in chemistry (500 level).....	18
Graduate Seminar (Chem 590).....	3
Thesis (Chem 599).....	6
Additional courses at 300, 400 or 500 level.....	18
Six units must be from outside the chemistry department.	

45

* Eight units from Chem 334, 335, 336, 338, 352, Zoo 426, 428 may be substituted.

† To be selected in accordance with the General Education requirement.

COMPUTER SCIENCE AND STATISTICS DEPARTMENT

Department Head, Daniel F. Stubbs

Emile E. Attala
Corine A. Bickley
James P. Bohle
William O. Buschman
Robert O. Butler
Tsun S. Chow
James C. Daly

Robert H. Dourson
Bernard B. Evans
Curtis F. Gerald
John E. Groves
Reino Hannula
John Y. S. Hsu
Elmo A. Keller

Sham S. Luthra
Y. Leon Maksoudian
John M. Rogers
Neil W. Webre
Charles J. Welty
Sing-Chou Wu

The department offers four-year programs which lead to the Bachelor of Science degree in Computer Science and to the Bachelor of Science degree in Statistics. The Master of Science degree in Computer Science is also offered. Courses in computer technology and probability and statistics, designed to fulfill the needs of the university as a whole, are also provided. Graduate-level courses are offered in computer science and statistical fields. Computer science courses offered by the department comprise those dealing with programming languages, computer organization, system software, and applications of computers. Statistics courses include probability theory, applications of statistical procedures, and the mathematical models on which these statistical methods are based.

The degree programs in computer science are designed to give fully professional training in this new field so that the student can make a significant contribution to his employer on graduation. Applications of the digital computer to a wide variety of situations are emphasized, and a thorough knowledge of computer systems is gained by developing facility in a variety of languages through which one communicates with computers, by study of programs which translate and compile such languages, and by "hands-on" involvement with programs which control the internal operation of computer systems. Such a broad and thorough undergraduate training is likewise good preparation for graduate study. Graduates in computer science are eagerly sought by the exciting and dynamic computer industry for positions as program analysts, systems engineers, applications programmers, and sales representatives. Access to modern computing equipment is afforded through the university's computer center, which conducts both educational and administrative applications.

The curriculum in statistics has an unusual emphasis on applications and on the use of the computer in statistical analysis of data. Students are expected to specialize in a field of application of their own choosing, and a significant number of elective courses are selected by the student to accomplish this. The statistics program prepares students for positions in industry and for graduate work in statistics. The department maintains for student use a calculating machine laboratory equipped with modern electrical and electronic calculators.

A student chapter of the Association for Computing Machinery is sponsored by the department. This active student organization supplements the department's activities in supplying vital contact with expert professional personnel from business and industry.



CURRICULUM IN COMPUTER SCIENCE

	F	W	S
Freshman			
Fortran Programming (CSc 101).....	2		
Boolean Algebra (CSc 218)		3	
Analytic Geometry and Calculus (Math 141, 142, 143).....	4	4	4
General Physics (Phys 131, 132)		4	4
Freshman Composition (Engl 104, 105)	3	3	
Report Writing (Engl 218)			3
* Biological Sciences	3		
General Chemistry (Chem 124)			4
Logic (Phil 221)	3		
* Physical Education	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Electives	1	2	1
	16½	16½	16½
Sophomore			
Linear Programming (CSc 219).....		3	
Computer Principles and Programming (CSc 221).....	3		
Digital Computer Symbolic Programming (CSc 222).....		3	
Digital Computer Programming (CSc 304 or 306).....			3
Programming (CSc 310 or 340).....			3
Numerical Linear Analysis (CSc 331).....	3		
Analytical Geometry and Calculus (Math 241).....	4		
Differential Equations (Math 242).....		4	
General Physics (Phys 133).....	4		
Principle of Economics (Ec 211, 212).....		3	3
* Literature			3
Basic Accounting (Actg 131, 132).....		3	3
* Physical Education	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Electives	2		1
	16½	16½	16½
Junior			
Advanced Fortran Programming (CSc 301).....	2		
Introduction to Numerical Methods (CSc 332).....		3	
Numerical Analysis (CSc 333).....			3
Data Structures (CSc 345).....	3		
Systems Analysis (CSc 350).....		3	
Algorithmic Compilers (CSc 351).....			3
Statistical Analysis (Stat 321, 322, 323)	3	3	3
* Humanities	3		
American Government (Pol Sc 201).....		3	
Managerial Accounting (Actg 301).....			4
Analog Computer Techniques (EL 313).....		3	
Principles of Digital Computers (EL 404).....	3		
Electives	3	2	3
	17	17	16
Senior			
Mathematical Programming (CSc 419)	3		
Programming Languages (CSc 451).....	3		
Computer Programming Systems (CSc 452).....	3		
Multi-Programming Systems (CSc 453).....		3	
** Computer Science elective.....			3
Senior Project (CSc 461, 462).....	2	2	
Undergraduate Seminar (CSc 463).....			2
Growth of American Democracy (Hist 204).....		3	
U.S. in World Affairs (Hist 205).....			3
Statistical Quality Control (IE 430).....			3
General Psychology (Psy 202).....		3	
Principles of Speech (Sp 200).....		3	
Electives	5	3	5
	16	17	16

* To be selected in accordance with the General Education requirement.

** To be selected from CSc 440, 445, 455.

Statistics

CURRICULUM IN STATISTICS

Freshman	F	W	S
Analytic Geometry and Calculus (Math 141, 142, 243)	4	4	4
Fortran Programming (CSc 101)	2		
Freshman Composition (Engl 104, 105, 218)	3	3	3
General Physics (Phys 131)		4	
General Biology (Bio 101)			3
** Social Sciences or Humanities	3		
** Physical Education	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
+ Electives	4	5	6
	16 $\frac{1}{2}$	16 $\frac{1}{2}$	16 $\frac{1}{2}$
Sophomore			
Analytic Geometry and Calculus (Math 241)	4		
Differential Equations (Math 242)		4	
Statistical Analysis (Stat 321)			3
Numerical Linear Analysis (CSc 331)			3
Principles of Economics (Ec 211, 212)	3	3	
** Natural sciences	4	4	
Principles of Speech (Sp 200)			3
Genetics (Bio 303)			3
** Physical Education	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
+ Electives	5	5	4
	16 $\frac{1}{2}$	16 $\frac{1}{2}$	16 $\frac{1}{2}$
Junior			
** Literature or philosophy	3		3
American Government (Pol Sc 201)		3	
Growth of American Democracy (Hist 204)			3
Statistical Analysis (Stat 322, 323)	3	3	
Statistical Uses of Computers (Stat 330)			3
Linear Algebra (Math 312, 313)	3	3	
Advanced Fortran Programming (CSc 301)	2		
Computer Programming (CSc 340 or 310)		3	
+ Electives	6	5	7
	17	17	16
Senior			
Senior Project (Stat 461, 462)	2	2	
Undergraduate Seminar (Stat 463)			2
U.S. in World Affairs (Hist 205)		3	
Probability Theory and Applications (Stat 425, 426)		3	3
Design of Experiments (Stat 424)	3		
** Humanities			3
Statistical Quality Control (IE 430)	3		
Introduction to Numerical Methods (CSc 332)	3		
+ Electives	6	8	8
	17	16	16

† At least 15 units must be selected with the approval of the adviser in one field in which statistics is applied.

** To be selected in accordance with General Education requirements.

CURRICULUM FOR MASTER OF SCIENCE DEGREE IN COMPUTER SCIENCE

(For University requirements see the *Graduate Study Bulletin*)

I. Required:			
CSc 560	Practicum in Computer Science	5	
CSc 590	Seminar in Computer Science	3	8
II. Complete two of the following sequences:			
*CSc 519, 520	Computer Modeling and Simulation	8	
CSc 531, 532, 533	Numerical Analysis	9	
CSc 541, 542	Information Processing	8	
CSc 551, 552	Computer Systems and Software	8	
Engr 520, 521, 522	Analog Computation and Simulation, Digital Systems, Computation Systems	9	16 to 18
III. Select, with approval of adviser, 15 units additional 300, 400, or 500 level courses in the mathematical sciences			
			15
IV. CSc 599 Thesis, or additional course work with comprehensive examination			
			4 to 6
Total units			45

* Not offered in 1973-74.



MATHEMATICS DEPARTMENT

Department Head, Charles J. Hanks

Sabah Al-hadad	Charles T. Haskell	Allen D. Miller
Alfred M. Bachman	Gilbert L. Homfeld	Paul F. Murphy
Bernard W. Banks	Kempton L. Huehn	Chester H. Scott
Charles D. Curtis	Rex L. Hutton	Howard Steinberg
James E. Delany	Boyd Walker Johnson	Henry B. Strickmeier
Gary M. Epstein	W. Boyd Judd	Neal R. Townsend
Oswald J. Falkenstern	Martin T. Lang	Ralph M. Warten
Gerald P. Farrell	Paul S. Lansman	Stephen T. Weinstein
Volmar A. Folsom	George C. Laumann	Patrick O. Wheatley
Jack E. Girolo	George M. Lewis	Milo E. Whitson
D. Edward Glassco	John J. Lowry	Arthur D. Wirshup
Stuart Goldenberg	George R. Mach	John A. Woodworth
Thomas E. Hale	John H. Manning	
	George H. McMeen	

The Mathematics Department offers a complete program of course work leading to a bachelor of science degree in mathematics with options in applied mathematics, computer science, and mathematics teaching. The department also offers mathematics courses needed in all other curricula for developing vocational and professional proficiency and for general education. The occupational flavor generated by these close interdepartmental relations increases both the usefulness of and the demand for the graduates who complete one of the degrees in mathematical sciences.

High school students planning a mathematics major should have at least three, preferably four, years of high school mathematics, and two years of science. Scores from the College Entrance Examination Board Scholastic Aptitude Test are used to determine the students' relative facility and competence in mathematics.

A program of study which leads to a Master of Science degree in Applied Mathematics is offered. A graduate of this program will be qualified for advanced positions in industry, business, civil service, college teaching, or other scientific endeavors. A Master of Arts degree in Mathematics is offered to further the preparation of students who may be working for a junior college or a secondary teaching credential.

CURRICULUM IN MATHEMATICS

Curricular Options

Applied Mathematics

The Applied Mathematics Option emphasizes preparation for industrial and civil service employment.

Computer Sciences

The Computer Sciences Option provides a significant core of theoretical and practical courses for occupational and professional competence in this new field.

Mathematics Teaching

The Mathematics Teaching Option provides the undergraduate basis in the preparation of the student for teaching at the secondary level.

Mathematics

Freshman	F	W	S
Analytic Geometry and Calculus (Math 141, 142, 143)	4	4	4
Fortran Programming (CSc 101)	2		
** Physics (Phys 131, 132)		4	4
English Composition (Engl 114, 115)	4	4	
* Physical Education	2	$\frac{1}{2}$	$\frac{1}{2}$
Electives and courses to complete major	4	4	8
	16	16 $\frac{1}{2}$	16 $\frac{1}{2}$
Sophomore			
Analytic Geometry and Calculus (Math 241)	4		
† Computer Principles and Programming (CSc 221)			3
Differential Equations (Math 242)		4	
Methods of Proof in Mathematics (Math 248)		3	
Statistical Analysis (Stat 321)			3
** Physics (Phys 133)	4		
Economics (Ec 201 or 211)		3	
* Social Sciences (not History)			3
* Oral and written expression			3
General Psychology (Psy 202)		3	
Electives and courses to complete major	9	4	4
	17	17	16
Junior			
Linear Algebra (Math 312)	4		
* Literature or Philosophy	3	3	
* Biological Sciences			3
* Natural Sciences (except Physics)	4	3	
American Government (Pol Sc 201)		3	
Growth of American Democracy (Hist 204)			3
Electives and courses to complete major	6	8	11
	17	17	17
Senior			
Senior Project (Math 461, 462)	2	2	
Undergraduate Seminar (Math 463)			2
* Literature	3		
U.S. in World Affairs (Hist 205)	3		
Electives and courses to complete major	8	14	14
	16	16	16

APPLIED MATHEMATICS OPTION (ADD COURSES BELOW TO MATHEMATICS CURRICULUM)

Junior and Senior Years

Math 318 Adv. Engineering Mathematics	(4)	Math 404 Vector Analysis	(4)
Math 319 Partial Differential Equations	(3)	Math 408 Complex Variables	(4)
CSc 332, 333, Numerical Analysis	(6)	Math 412 Advanced Calculus	(3)
Math 381 Modern Algebra	(4)	Math 413 Advanced Calculus	(3)

* To be selected in accordance with the General Education requirement.

** Teaching option majors may substitute Phys 121, 122, 123.

† Teaching option majors may substitute CSc 110.

Mathematics

COMPUTER SCIENCE OPTION (ADD COURSES BELOW TO MATHEMATICS CURRICULUM)

Sophomore Year

CSc 218 Boolean Algebra	(3)	Math 318 Adv. Engineering	(4)
CSc 219 Linear Programming	(3)	Mathematics	
CSc 304 Computer Programming	(3)		

Junior and Senior Years

CSc 301 Advanced Fortran	(2)	CSc 419 Mathematical Program- ming	(3)
CSc 310 PL/I	(3)	CSc 332, 333 Numerical Analysis	(6)
CSc 350 Operations Research	(3)	Stat 322 Statistical Analysis	(3)

MATHEMATICS TEACHING OPTION (ADD COURSES BELOW TO MATHEMATICS CURRICULUM)

Junior and Senior Years

Math 341 Theory of Numbers	(3)	Math 442 College Geometry	(3)
Math 381, 382 Modern Algebra	(8)	Math 456 Concepts of Analysis	(3)
Math 403 Secondary School Math	(5)	Stat 322 Statistical Analysis	(3)
Math 444 Projective Geometry	(3)	CSc 331 Linear Analysis	(3)

CURRICULUM FOR THE MASTER OF ARTS DEGREE

(For University requirements see the Graduate Study Bulletin)

I. Required:	<i>Units</i>
Math 509, 510, 521, 580	12
II. Select 12 units from the following:	
Math 505, 506, 507, 508, 511, 531, 580, 596	12
III. Select 12 units from any 300, 400, 500 courses having the prefixes, Math, CSc, Stat approved by the M.A. Mathematics Committee	12
IV. Elect 9 additional units with approval of adviser	9
V. Satisfactorily complete a terminal written and oral examination; or complete Math 596, Graduate Thesis, for 6 units credit under II.	—
Total units	45

CURRICULUM FOR THE MASTER OF SCIENCE DEGREE IN MATHEMATICS (APPLIED)

(For University requirements see the Graduate Study Bulletin)

I. Required: Math 512, 514, 593; CSc 531	<i>Units</i>
12	
II. Select four from the following courses: Math 513, 515, 516, 518, 531; CSc 532, 533; Stat 527, 528	12
** III. Select with approval of adviser 9 units in one area other than mathematics, statistics, and computer science (physics, engineering, economics, chemistry, etc.)	9
IV. Electives with approval of advisory committee to be selected from mathematics, computer science, or statistics courses	12
V. Satisfactorily complete comprehensive examination	—
Total units	45

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Computer Science, Mathematics, Statistics and Probability, and other subjects.

** Candidates with an approved Bachelor's or higher degree in a field other than mathematics, computer science or statistics may substitute advisor approved 300 and 400 level Math, CSc or Stat. courses.

MILITARY SCIENCE DEPARTMENT

Department Head, Colonel William C. Black

Capt. Richard W. Farr
Capt. Leonard L. Gringas
Maj. Bruce D. Nagle

Maj. Donald R. Sims
Capt. Richard A. Terry
Capt. Henry Wendling

PURPOSE

The production of qualified, educated junior officers for the United States Army is a vital part of the National Defense effort. The Military Science Department conducts ROTC (Reserve Officer Training Corps) instruction for students who desire to fulfill their military obligation as commissioned officers. Additionally, certain outstanding students are offered direct commissions in the U. S. Regular Army. As in any other academic courses, credits accrued for completing Military Science courses are awarded toward college graduation. It is permissible for students not enrolled in the ROTC program to enroll in particular Military Science classes for elective credit based on the determination that the student load is within the capability of the assigned instructor group. To be eligible for participation in ROTC, a student must be a regularly enrolled male student of this institution, have sufficient time remaining as a university student to permit completion of the advanced ROTC course prior to reaching his 28th birthday, and be physically qualified. Medical acceptability for the basic course requires a statement from the student's physician that the individual is medically fit to participate in the ROTC program, a program not more strenuous than a college physical education program. ROTC scholarships are available; see under SCHOLARSHIPS.

ROTC removes most uncertainties connected with the student's military obligation. Senior students are given the opportunity to request the month they desire to be called to active duty, the branch of the army in which they desire to be commissioned, and the general geographical area in which they desire to be stationed while performing their active duty.

EQUIPMENT AND UNIFORMS

All necessary ROTC equipment, uniforms and text books are furnished to the student by the United States government free of charge. Title to this property, other than expendable items, remains with the government. Upon entry into active duty after graduation, each commissioned student is granted a special \$300 uniform allowance to use for purchasing his own uniforms.

DRAFT DEFERMENT

Each regularly enrolled ROTC student may execute a deferment agreement with the United States government at the end of the first quarter of his freshman year. The agreement provides absolute draft deferment as long as the student remains enrolled in the ROTC program.

Graduating students who have completed the ROTC program and who apply to and are accepted by accredited institutions for graduate instruction, upon approval of the Department of the Army, are deferred from active duty to obtain a graduate degree.

FOUR YEAR PROGRAM

The four year elective ROTC program is a progressive course of instruction divided into a two year basic course and a two year advanced course.

Students with previous military service, or with Junior or Senior ROTC credit from another institution, may be granted advanced standing in the course. Students who will complete degree requirements in three academic years may enroll in freshman and sophomore ROTC courses concurrently and complete the four-year program in three years.

Army regulations permit a student to substitute related academic courses for one quarter of each of the last two years of the ROTC program. These academic courses are in place of the regular MSc winter quarter requirements during each of the junior and senior year sequences.

Military Science

Four year program students are required to attend only one summer training camp for a six week period following completion of their junior year. The government furnishes all uniforms, equipment, room, board, and medical care for students at camp. Additionally, each student is paid at the rate of one half a Second Lieutenant's pay and is provided a six-cents-per-mile transportation allowance from and to his home.

Students who elect to enter the advanced course of ROTC instruction are paid \$100 per month while they are enrolled in the advanced course. There is no obligation connected with the receipt of this subsistence allowance other than the willingness by the student to accept a reserve commission of Second Lieutenant if it is offered to him upon graduation and to serve a period of two years on active duty as a commissioned officer.

TWO YEAR PROGRAM

The opportunity offered by ROTC training is available in a special program to transfer students and to currently enrolled college students who were unable, for cogent reasons, to participate in the four year ROTC program.

To qualify for the two year program, the student must complete a special basic ROTC summer camp of six weeks duration. Those students currently enrolled at this university will complete the basic camp between their sophomore and junior years. Transfer students must complete the camp during the summer immediately prior to their matriculation at this university. It is important that potential transfer students who plan to participate in the two year ROTC program make their intentions known directly to the Head, Military Science Department, no later than 1 March of the year they plan to register at the university even though this date may precede the date of their final acceptance by the university.

The government will provide six-cents-per-mile transportation allowance to and from basic summer camp, and the rate of pay as an Army Private. All equipment, uniforms, room and board are furnished free while at camp. The basic summer camp is in addition to the advanced summer camp which must be taken at the end of the junior year as part of the advanced course. No university credit is given for the basic summer camp.

Upon successful completion of the basic summer camp, the student is admitted directly into the advanced ROTC course in September during his registration at the university. He is entitled then to the advanced course subsistence allowance and all other privileges of advanced course standing as enumerated above under the four year program.

FLIGHT INSTRUCTION PROGRAM

The Army ROTC Flight Instruction Program is offered to students in the second year of the advanced course. The student receives a basic introduction to the principles of flight in single engine, fixed-wing aircraft. The program is conducted as an extracurricular activity, without cost to the student. Each student receives 35 hours of ground instruction and 36½ hours of in-flight instruction.

The student must be enrolled in or have completed MS IV and must complete satisfactorily a physical examination and flight aptitude tests. Approval of the dean of the applicant's school and the Professor of Military Science is required.

See **COURSES OF INSTRUCTION** section of this catalog for descriptions of courses in Military Science and other subjects.

PHYSICS DEPARTMENT

Department Head, Robert H. Frost

Lawrence H. Balthaser	Teymoor Gedayloo	David M. Roach
Joseph C. Boone	David W. Hafemeister	Arthur Z. Rosen
Athol J. D. Brunk	Ray J. Holt	Gordon A. Silver
Anthony J. Buffa	Aernat S. James	Willem L. Van
David H. Chipping	Herbert R. Kabat	Wyngaarden
William E. Clements	W. Reed Langford	Orvin E. Wagner
Robert H. Dickerson	Leon W. Magur	Leonard W. Wall
Walter E. Elliott	Kenneth S. Ozawa	Walter D. Wilson
Theodore C. Foster	Ralph A. Peters	Lloyd J. Work

The Physics Department serves all schools of the University by offering courses which help provide scientific explanations for work taken by students in their major fields. The department also contributes to the general education of all students by giving them a thorough foundation in the method and factual content of the physical sciences and the roles which they play in society. The physics curriculum leads to the bachelor of science degree.

The occupational objectives of the curriculum in physics are to qualify students for entry at the bachelor's level into positions in government service and industry and to help prepare teachers of the physical sciences. Graduates are engaged in the development and design of products associated with electronics, aircraft, guided missiles, satellites, atomic power, petroleum, paper, metals, textiles and plastics.

Graduate courses are offered which help to complete the requirements for the teaching credentials and for the master of arts degree in education with a concentration in the physical sciences.

It is suggested that the high school student planning to major in physics include in his high school program as much as possible of the following: six semesters of college preparatory mathematics, two of physics and two of chemistry.

CURRICULUM IN PHYSICS

Freshman	F	W	S
Biological Sciences (Bio 101, Bot 121, or Zoo 131)	3		
Written communication (Engl 104, 105, 114, 115, or 218)	3		3
Manufacturing Processes (MP 141, 142)	1	1	
* Physical Education	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Analytic Geometry and Calculus (Math 141, 142, 143)	4	4	4
General Chemistry (Chem 121, 122)	4	4	
Organic Chemistry (Chem 226)			4
General Physics (Phys 131, 132)		4	4
Introduction to Physics (Phys 100)	1		
	<u>16½</u>	<u>16½</u>	<u>15½</u>
Sophomore			
Economics (Ec 201 or 211)			3
* Physical Education	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Analytic Geometry and Calculus (Math 241)	4		
Differential Equations (Math 242)		4	
Fortran Programming (CSc 101)	2		
Advanced Engineering Mathematics (Math 318)			4
General Physics (Phys 133, 134)	4	3	
Modern Physics (Phys 211)		4	
Introduction to Nuclear Physics (Phys 213)			3
Introductory Nuclear Physics Laboratory (Phys 243)			1
Electrical Circuits (Phys 206)		3	
Electrical Measurements Laboratory (Phys 256, 257)		1	1
** General Education elective	3		
* Humanities	3		
Electives			4
	<u>16½</u>	<u>15½</u>	<u>16½</u>

* To be selected in accordance with the General Education requirement.

** Chosen from Astronomy, Geology, Biological Sciences, Social Sciences (other than History).

Physics

Junior	F	W	S
* Literature			3
* Literature or philosophy		3	
Partial Differential Equations (Math 319)	3		
Heat (Phys 301)	3		
Analytic Mechanics (Phys 302, 303)	3	3	
Solid State Physics (Phys 406)		3	
Solid State Physics Laboratory (Phys 456)			1
Quantum Mechanics (Phys 405)	3		
Quantum Physics Laboratory (Phys 341, 342)	1	1	
Physical Optics (Phys 323)			4
Undergraduate Seminar (Phys 363)			2
Electives	3	6	6
	16	16	16
Senior			
American Government (Pol Sc 201)	3		
Growth of American Democracy (Hist 204)		3	
U.S. in World Affairs (Hist 205)			3
* Social sciences (not History)	3		
Electricity and Magnetism (Phys 408, 409)	4	3	
Senior Project (Phys 461, 462)	2	2	
Approved Physics electives	3	3	3
Electives		5	10
	15	16	16

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Physics and Physical Science and other subjects.

* To be selected in accordance with the General Education requirement.



COURSES OF INSTRUCTION



SCHOOLS, DEPARTMENTS AND COURSE PREFIXES

SCHOOL OF AGRICULTURE AND NATURAL RESOURCES

Agricultural Management	ABM, AM, FM
Agricultural Education	Ag Ed
Agricultural Engineering	AE, MarE
Agriculture	Ag
Animal Science	A Sci
Crop Science	CrSc, FrSc, VgSc
Dairy and Poultry Science	DH, DM, PI
Food Industries	FI
Natural Resources Management	NRM
Ornamental Horticulture	OH
Soil Science	SS
Veterinary Science	VS

SCHOOL OF ARCHITECTURE AND

ENVIRONMENTAL DESIGN	Arch, ArcE, CRP, ConE, EDes, LA
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SCHOOL OF BUSINESS AND SOCIAL SCIENCES

Business Administration	Actg, BA, Bus, FPM, IR, Mgt, Mktg
Economics	Econ
Social Sciences	Ant, Ar, Geog, Soc Sc, Soc, Lib
Political Science	Pol Sc

SCHOOL OF COMMUNICATIVE ARTS AND HUMANITIES

Art	Art
English	Engl
Foreign Languages	ForL, Fr, Ger, Span
Graphic Communications	GrC
History	Hist
Humanities	Hum
Journalism	Jour
Music	Mu
Philosophy	Phil
Speech Communication	Sp, Dr

SCHOOL OF ENGINEERING AND TECHNOLOGY

Aeronautical Engineering	Aero
Electronic and Electrical Engineering	EL, EE
Engineering	Engr
Engineering Technology	ET, MP, Weld
Environmental Engineering	EnvE
Industrial Engineering	IE
Industrial Technology	IT
Mechanical Engineering	ME
Metallurgical Engineering	Met
Transportation Engineering	TE

SCHOOL OF HUMAN DEVELOPMENT AND EDUCATION

Child Development	CD
Education	Ed
Ethnic Studies	Eth S
Home Economics	HE
Physical Education—Men	PE
Physical Education—Women	PE
Psychology	Psy

SCHOOL OF SCIENCE AND MATHEMATICS

Biological Sciences	Bact, Bio, Bot, Cons, Ent, Zoo
Chemistry	Chem
Computer Science and Statistics	CSc, Stat
Mathematics	Math
Military Science	MSc
Physics	Astr, Geol, Phys, PSc

ACCOUNTING

Actg 131, 132 Basic Accounting (3) (3)

A study of accounting to show how records are kept, their uses and limitations. For the student who needs a general knowledge of accounting. Not applicable for credit toward major in business administration. 2 lectures, 1 two-hour laboratory.

Actg 221, 222 Principles of Accounting (4) (4)

Principles and practices of fundamental accounting theory. 3 lectures, 1 two-hour laboratory.

Actg 223 Cost Accounting and Analysis (4)

Accounting for cost control applicable to production, distribution, and service enterprises. Analysis and interpretation of financial statements. 4 lectures. Prerequisite: Actg 132 or 222

Actg 301 Managerial Accounting (4)

Relationship of accounting to business. Analysis of accounting principles and procedures to needs of business. 4 lectures. Prerequisite: Actg 132 or 222

Actg 304 Tax Accounting (4)

Federal and state income taxation of individuals. 4 lectures. Prerequisite: Actg 131 or 221

Actg 305 Tax Accounting (4)

Federal and state income taxation of corporations, partnerships, estates and trusts. Federal and state gift and death taxes. 4 lectures. Prerequisite: Actg 132 or 222 and 304

Actg 321, 322 Intermediate Accounting (4) (4)

Conventional financial accounting: theory, problems and contemporary issues. 4 lectures. Prerequisite: Actg 222

Actg 323 Advanced Accounting (4)

Accounting theory and practice relating to partnerships, special sales procedures, foreign branches and subsidiaries, fiduciaries and non-profit organizations. 4 lectures. Prerequisite: Actg 322

Actg 332 Advanced Cost Accounting (4)

Process and standard costs; overhead costs, budgeting. Use of cost accounting data in economic analyses and managerial control. 4 lectures. Prerequisite: Actg 223

Actg 333 Governmental Accounting (4)

Accounting for governmental and non-profit organizations. Use of accounting information to control and achieve objectives of the programs involved. 4 lectures. Prerequisite: Actg 132 or 222

Actg 421 Business Combinations (4)

Authoritative accounting methods and their applications for business combinations including mergers and consolidations. Consideration of related problems and financial reporting requirements. 4 lectures. Prerequisite: Actg 323 and Bus 207 or permission of instructor.

Actg 431 Professional Accounting (4)

Development of the accounting profession. Past, present and future. Emphasis on contemporary issues confronting the professional accountant and his social and ethical responsibilities and opportunities. 4 lectures. Prerequisite: Actg 322 or consent of instructor.

Actg 446 Auditing (4)

Professional auditing: theory, philosophy and problems. 4 lectures. Prerequisite: Actg 322. Bus 321 is recommended.

Actg 452 C.P.A. Review (5)

Intensive study of accounting topics appearing in C.P.A. examinations. Designed specifically for students preparing for the C.P.A. examination. 3 lectures, 2 two-hour laboratories. Prerequisite: Actg 305, 323 and 446

AERONAUTICAL ENGINEERING

Aero 101 Aircraft and Missile Fundamentals (3)

Fundamentals of aircraft and missile systems. Field trips conducted to existing departmental laboratories permit students to operate, and to see in operation, equipment used by aeronautical engineers. Not for aeronautical engineering majors. 3 lectures.

Aero 121, 122, 123 Aerospace Fundamentals (2) (2) (2)

Introduction to the engineering profession including the aeronautical and aerospace fields. Engineering approach to problem-solving and analysis of data obtained from experiments. Basic nomenclature and design criteria used in the aerospace industry. Applications to basic problems in the field. 2 laboratories.

Aero 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

Aero 202 Mechanics of Materials (5)

Stresses, strains, deflections due to axial, torsional, and flexural loading. Statically indeterminate members and columns. Dynamic and repeated loading. Emphasis on problem-solving. May not be substituted for Aero 207. 5 lectures. Prerequisite: ME 205 or equivalent.

Aero 207 Strength of Materials (5)

Stresses, strains, and their relations applied to axial, torsional, and flexural loads. Statically indeterminate axial members, beams, and shafts. Columns, dynamic loads, repeated loads. 5 lectures. Prerequisite: ME 211

Aero 229 Strength of Materials Laboratory (1)

Physical properties of engineering materials. Tension, compression, bending, shear, and torsion tests. Tests of riveted and bolted joints. Tests of long and short columns. Effect of heat treatment on material properties. Use of the SR-4 strain rosette for determining principal strains. Reporting of results in the form of written reports. 1 laboratory. Concurrent: Aero 207

Aero 240 Additional Engineering Laboratory (1-2)

Total credit limited to four units, with not more than two units in any one quarter. 1 or 2 laboratories.

Aero 301, 302, 303 Aerothermodynamics (5)

Properties and characteristics of fluids, fluid statics and dynamics, the thermodynamic relations, the properties of subsonic and supersonic flow, both laminar and turbulent. 5 lectures, fall; 4 lectures, 1 laboratory, winter and spring. Prerequisite: ME 211, Math 318

Aero 306 Aerodynamics (5)

The standard atmosphere, compressible flow, airspeed measurements, types of fluid flow, airfoil theory, wing theory, lift, drag, expansion waves, normal and oblique shock waves, aircraft performance, stability and control. 5 lectures. Concurrent: Aero 303

Aero 322 Analog Computer Techniques (4)

The solution of typical problems and dynamics that an aeronautical engineer might encounter by use of analog computer techniques. 2 lectures, 2 laboratories. Prerequisite: Math 141

Aero 324 Stress Analysis (5)

Analysis of airplane and missile structural components; combined stress and failure theories; column and sheet-stringer panel analysis. Shear-resistant and tension-field beams; single and multi-cell box beams; unsymmetrical and tapered beams. Bulkhead and cutout analysis; analysis of indeterminate structures. Laboratory tests of typical aircraft structural components. Experimental methods of stress analysis. 4 lectures, 1 laboratory. Prerequisite: Math 242, Aero 207

Aero 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

Aero 401, 402 Aircraft and Missile Propulsion Systems (4) (3)

Flightcraft power plant types, components, characteristics, and requirements. Principles of thrust and energy utilization. Thermodynamic processes and performance of turboprop, turbo jet, ramjet, and rocket engines. 401: 3 lectures, 1 laboratory. 402: 3 lectures. Prerequisite: Aero 303

Aero 403 Rocket Propulsion (3)

Classification of propulsion systems. Definitions of rocketry terms. Rocket history. Nozzle theory and thermodynamic relations. Rocket propellant performance calculations. Heat transfer in rocket thrust chambers. Liquid propellant rocket systems. Solid propellant rocket fundamentals. Design of solid propellant rockets. Flight performance. Rocket testing. 3 lectures. Prerequisite: Aero 402

Aero 404, 405 Gas Dynamics (3) (3)

Fundamental theory of one dimensional gas dynamics. Shock wave propagation, normal and oblique shocks, Rayleigh line flow, Fanno line flow, Prandtl-Meyer function, supersonic wind tunnel, and measurement methods. 3 lectures. Prerequisite: Aero 303

Aero 406 Introduction to Boundary-Layer Theory (3)

Concept of the boundary-layer. Boundary-layer equations, the similarity concept, fundamental similarity solutions, the thermal boundary-layer. 3 lectures. Prerequisite: Aero 303 or equivalent.

Aero 407 Aerospace Science (3)

History of aviation, rocketry, and space flights; fundamentals, descriptions of propulsion of flight vehicles, trajectories and orbital mechanics, aerodynamics, re-entry, pyrotechnics, nucleonics, electrical power for guidance, telecommunication; aerospace environment, flight vehicles, spacecraft, and sounding rockets. 3 lectures. Prerequisite: Junior standing.

Aero 408 Advanced Flightcraft Structural Analysis (4)

Indeterminate structures, frame analysis, treatment of plates and shells, shear lag and deformation, effect of skin cutouts, application of structural theory including matrix methods to the design of flightcraft components. 3 lectures, 1 laboratory. Prerequisite: Aero 324, Math 318

Aero 409 Flight Testing (3)

Flight test instrumentation, obtaining of data and methods of data reduction for determining aircraft and engine performance, aircraft stability and control and structural integrity. Evaluation of hydraulic, electrical, communication, control, and air conditioning systems. Compliance with specifications. Severe environmental operation. 3 lectures. Prerequisite: Aero 303

Aero 410 Potential Flow Theory (3)

Introduction to potential flow and its application to aerodynamics. Potential flow over two and three dimensional bodies. Potential flow theory. Development of the Blasius force theorems and Prandtl lifting theory. 3 lectures. Prerequisite: Aero 404, Math 318

Aeronautical Engineering

Aero 411, 412, 413 Space Technology (3) (3) (3)

Motion of a body in the central force field. Space vehicle trajectories, guidance systems, power generators for interplanetary travel, structural loading, and principles of space vehicle design. 3 lectures. Prerequisite: Aero 303

Aero 414 Theory of Elasticity (3)

Analysis of stress, strain, plane stress, plane strain. Compatibility equations, strain energy methods. Problems in extension, torsion, and flexure. 3 lectures. Prerequisite: Aero 324

Aero 415 Aerodynamics of Stability and Control (3)

Longitudinal stability and control. Static and dynamic stability, wing moments and balance. Factors influencing the stability of the complete airplane. Lateral and directional stability. Design and operation of control surfaces. Compressibility effects. 3 lectures. Prerequisite: Aero 303

Aero 416 Unconventional Aircraft (3)

Introduction to analysis of rotary wing aircraft, VTOL, STOL, and lifting body vehicles. Types of flight control mechanism. Performance and stability of vehicles. 3 lectures. Prerequisite: Aero 303

Aero 417 Structural Dynamics (4)

Effect of shock and vibration loads on aircraft and missile structures. Thermal loading and other transient loads imposed by the vehicle mission. 4 lectures. Prerequisite: ME 316

Aero 418 Aeroelasticity (3)

Analysis of the aeroelastic problems of divergence, control reversal, flutter, and transient response including related topics in vibrations and structures. 3 lectures. Prerequisite: Aero 306, 408

Aero 419 Analysis of Aeronautical Systems (3)

Application of elementary systems analysis and operation analysis techniques to the project development phase of an aerospace vehicle or system. 3 lectures.

Aero 444, 445 Missile and Aircraft Design Laboratory (4) (4)

Preliminary layout of a typical transport aircraft and a space vehicle using design and calculation techniques developed in previous aeronautical engineering courses. Design of selected component structures and preparation of necessary drawings. 2 lectures, 2 laboratories.

Aero 457, 458 Aeronautical Engineering Laboratory (3) (3)

Use of laboratory instruments to develop the technique of obtaining engineering measurements, special assigned problems in the field of aeronautics. 1 lecture, 2 laboratories. Prerequisite: Aero 303

Aero 461, 462 Senior Project (2) (2)

Selection and completion of a project which is typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time. Prerequisite: Senior standing.

Aero 463 Undergraduate Seminar (2)

Studies and technical developments in the field of Aeronautical Engineering. 2 meetings. Prerequisite: Senior standing.

Aero 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

AGRICULTURAL BUSINESS MANAGEMENT

ABM 103 Agricultural Business Organization (3)

Development, types and forms of farm related businesses. Agricultural businesses considered from standpoint of primary functions, services and problems including such factors as business organization, records, information, location, production, business with banks, labor and government. Emphasis on California farm related industries. 3 lectures.

ABM 201 Agricultural Business Sales and Service (3)

Growth and opportunities in agricultural sales. Factors involved in developing sales program for the farm operation. Application of successful selling principles and practices in providing farm operators with agricultural materials, supplies, equipment and services. Consideration given to sales and service for farm related businesses and non-agricultural customers. Selling aspects involved in marketing of farm products by farm related businesses. 3 lectures.

ABM 202 Agricultural Cooperative Organization and Management (3)

Purpose, types and organization of cooperatives. Emphasis on California agricultural cooperatives, their characteristics, operation and problems. 2 lectures, 1 two-hour laboratory.

ABM 211 Fair Management (3)

Principles and procedures in organizing, managing and promoting fairs. Emphasis on California and Western fairs. Career opportunities, programs and problems in fair management and growth of fairs in America. A two-day field trip is included to a county or district fair. 3 lectures.

ABM 230 General Agricultural Business Management (3)

Agricultural business growth, opportunities, functions and services, organization and operation. Emphasis on California agricultural businesses and industries. A general course for non-Agricultural Business Management majors. 3 lectures.

ABM 241 Agricultural Business Machines Practices (1)

Evolution, application, and costs of calculator type machines. Basic calculator procedures, practices, and techniques needed to work agriculturally related statistical problems. 1 activity.

ABM 301 Agricultural Business Management and Government Policy (3)

Agricultural business policy, objectives and formulation, resource allocation and production adjustments; government subsidies, acreage controls, storage, crop insurance, forward prices, consumer subsidies, economic, social and political influences. 3 lectures. Prerequisite: Ec 211

ABM 302 Agricultural Business Sales Management (3)

Organizing and coordinating agricultural machinery, crop, livestock, poultry, fertilizer, insecticide and other farm and farm related sales and service programs. Planning, policies, pricing, sales control records, training salesmen, advertising, supervising salesmen, and evaluating sales performance as related to needs and demands of farm and farm related agricultural businesses. 3 lectures. Prerequisite: ABM 201

ABM 303 Agriculture—Consumer Relationships (2)

Basic facts, public opinion and ways of developing greater understanding of agriculture, its nature, characteristics, problems and relationship to non-farm persons. Consumer education programs and procedures. 2 lectures.

ABM 305 Farm Group and Commodity Organizations (2)

Survey of farmers' efforts to study and seek solutions to individual and industry-wide problems through organized group effort. Major farm organizations, policies and services to members. 2 lectures.

ABM

ABM 306 Government Agricultural Service Agencies (2)

Programs and services performed by government agencies on behalf of farm and off-farm agricultural industries. Designed for students who may use services of, who may advise others of such services, or who may seek a career in such agencies. 2 lectures.

ABM 321 Agricultural Property Management and Sales (4)

Land economic, legal and real estate principles in the investment, development, leasing, mortgaging and transferring of agricultural real estate. 3 lectures, 1 two-hour laboratory.

ABM 322 Advanced Agricultural Business Management (4)

Agricultural business management with primary emphasis on economic analysis; application of economic principles to the solution of basic pricing, output, and resource use problems encountered by the individual agricultural business firm. 3 lectures, 1 two-hour laboratory. Prerequisite: Ec 211

ABM 323 Advanced Agricultural Business Management (4)

Agricultural business management with primary emphasis on cost accounting procedures, policy formation, financial, fiscal and material resources management. Includes budgets, business statements and other planning and control procedures. Agricultural business insurance, taxation, office management, and related phases in management of the agricultural business firm. 3 lectures, 1 two-hour laboratory. Prerequisite: Actg 222 and ABM 322 or consent of instructor.

ABM 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

ABM 402 Agricultural Business Communication (3)

Principles, methods and materials for communicating ideas, information and skills to management, staff members, stockholders, customers and general public. Agricultural business public relations programs. Organization and presentation of surveys, studies, reports and publications. 2 lectures, 1 two-hour laboratory. Prerequisite: Engl 218 and senior standing.

ABM 403 Agricultural Labor Relations and Personnel Management (3)

Agricultural labor trends and problems as determined by changes occurring in farming and farm related industries. Labor-management relations in agriculture; principles and procedures in organizing and managing the agricultural business personnel program. 3 lectures. Prerequisite: Senior standing.

ABM 412 Wholesaling and Retailing Agricultural Commodities (3)

The field of wholesaling and retailing agricultural commodities including auctions, commission houses, commission merchants, food brokers, carlot receivers, jobbers, shippers and supply houses. Principles of buying and selling; terms and trade customs. 3 lectures. Prerequisite: Ec 211, AM 304

ABM 421 Agricultural Business Operations Analysis (4)

Principles and procedures in agricultural business operations analysis and research. Evaluation of programs and problems to achieve optimal decisions. Production and financial data, statistics, pricing, costs, inventories, production level, and plant expansion or contraction. 3 lectures, 1 two-hour laboratory. Prerequisite: ABM 322, Stat 212

ABM 427 Agricultural Estate Planning (4)

Principles and procedures in agriculture estate planning and conservation. Determining agriculture estate assets, taxes, property valuation, property transfers, beneficiaries and needs, gifts, insurance, business estate, employee estate, wills, trusts, and administration of trusts and estates. 3 lectures, 1 activity period. Prerequisite: ABM 321

ABM 443 Field Studies in Agricultural Business Management (2)

California commercial agricultural businesses. Visitation to selected industries. Organization, operation, services and problems considered. One week in field and one week laboratory analysis and evaluation of data obtained on the trip. Prerequisite: Senior standing or consent of instructor.

ABM 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

ABM 463 Undergraduate Seminar (2)

Student presentation and leadership; group participation under faculty supervision on new agricultural business developments. 2 lectures.

ABM 515 International Agri-Business Marketing (3)

Problems and techniques of U.S. international marketing. Sales promotion, advertising, and market research for agricultural commodities. Tools, equipment, and supplies for agriculture in the developing countries. 3 lectures. Prerequisite: AM 304, FM 307 or consent of instructor.

ABM 516 Communication for Change in Developing Countries (3)

Analysis of literature, techniques and procedures for planning and carrying out agricultural information programs in developing countries. Current relevant information for foreign agricultural producers. 3 lectures. Prerequisite: FM 307

ABM 581 Graduate Seminar in Agricultural Business Management (3)

Current trends and characteristics of agricultural business and industry. Opportunities and requirements for becoming established in farm-related businesses. 3 lecture-discussions.

AGRICULTURAL EDUCATION

Ag Ed 202 Introduction to Agricultural Education (2)

Overview of agricultural education programs including goals and purposes. Kinds of classes and types of programs. Qualifications essential to success in teaching agriculture. Planned program of studies to meet requirement for teaching. 2 lectures.

Ag Ed 403 Teaching Plans and Procedures in Agricultural Education (3)

Preparation for student teaching in agriculture. Orientation to classroom situation. Development of plans for teaching including daily lessons and unit plans; utilization of source information and resources. Class demonstrations in teaching procedures; analysis and evaluation. 1 lecture, 2 activity periods.

Ag Ed 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

Ag Ed 520 Program Development in Agricultural Education (3)

Development of up-to-date approaches to a total integrated program based on occupational opportunities and community needs. Philosophy, organization and administration of agricultural education programs. Development in such areas as curriculum, supervised occupational experience, Future Farmers of America, and summer programs. 3 lectures.

Ag Ed 522 Instructional Programs in Agricultural Mechanics (3)

Organizing the vocational agriculture mechanics curriculum and determining course content. Student demonstrations and presentations; evaluation and analysis. 1 lecture, 2 laboratories.

Ag Education

Ag Ed 523 Adult and Continuation Education in Agriculture (2)

Organization, history, philosophy, administration and teaching of classes for out-of-school youth and adults. Surveys and plans for development of rural and urban adult education programs. Young Farmer program. Techniques and methods of leadership. 2 activities

Ag Ed 580 Special Problems in Agricultural Education (1-3)

Individual study of modern issues and problems conducted through research, planning and development. Field problems and in-service study in agricultural industry encouraged. Final written report to be submitted. Total credit limited to nine units with not more than three units in any one quarter. Prior approval of instructor required.

Ag Ed 621 (A-Z) Technical Agricultural Developments (1-3)

Group study of new technological and scientific agricultural and related occupations. Provided through such activities as workshops, special meetings and assignments. Prior departmental approval necessary.

Ag Ed 631 (A-Z) Professional Conference in Agriculture (1-3)

A series of lectures, seminars and/or workshops concerning agricultural education conducted by specialists in the field. New developments in teaching and methodology at various levels of instruction; assessment of innovations and procedures. For the professional improvement of vocational educators.

AGRICULTURAL ENGINEERING

AE 100 Agricultural Engineering (1)

Professional opportunity. Solution of agricultural engineering problems requiring coordinated mathematical, graphical and written expression. 1 lecture.

AE 121 Agricultural Mechanics (2)

Identification and use of tools and materials; tool sharpening and care; concrete mixes and materials; simple electric wiring; metal work; pipe fitting; basic wood-working; estimating quantities and costs. 1 lecture, 1 laboratory.

AE 122 Agricultural Mechanics (2)

Design, construction and repair of production equipment for livestock, dairy and poultry equipment. 1 lecture, 1 laboratory. Prerequisite: AE 121 or demonstrated equivalent ability.

AE 123 Ornamental Horticulture Mechanics (2)

Design, construction and repair of equipment for ornamental horticulture. Construction of ornamental horticulture equipment and facilities. 1 lecture, 1 laboratory. Prerequisite: AE 121 or demonstrated equivalent ability.

AE 128 Agricultural Mechanics (2)

Selection of materials for farm construction. Plans, interpretation and bills of materials. Development of skills in wood and metal working. Concrete proportioning and quality tests. 1 lecture, 1 laboratory. Prerequisite: completed or concurrent college drafting.

AE 130 Irrigation Practices (2)

Application of good irrigation practices on the farm. Choice and evaluation of methods; soil, water, and plant relationships; when and how much water to apply; water measurement; water quality and drainage; elements and operation of irrigation systems. 1 lecture, 1 laboratory. Prerequisite: SS 121, Math 103

AE 131 Agricultural Surveying (2)

Introduction to basic surveying techniques as applied to agriculture. Keeping field notes; land measurement by tape; differential and profile leveling; contour and plane table mapping; land surveying and identification; fundamentals of land grading. 1 lecture, 1 laboratory. Prerequisite: Math 103

AE 133 Agricultural Drafting (2)

A basic course in technical drawing oriented toward working drawings of farm shop projects. Freehand sketching and instrument techniques. Multiview projection and pictorial drawings. 2 laboratories.

AE 134 Agricultural Electrification (3)

Fundamentals of electric wiring and code regulations; selection, installation and maintenance of electric motors. For students other than degree majors in Agricultural Engineering or Mechanized Agriculture. 2 lectures, 1 laboratory. Prerequisite: Math 103 or 113

AE 141 Agricultural Tractors and Equipment Skills (3)

Operational skills in the selection and matching of agricultural and utility industrial equipment. Supervised operational practice in the field. 1 lecture, 2 laboratories

AE 142 Agricultural Power and Machinery Management (4)

Evaluation of agricultural tractors and machinery performance. Power applications and hydraulic systems. Evaluation of performance of tillage, seeding and planting, weed control, hay and grain harvesting, and farm processing equipment. Emphasis on management. Selection, operation, maintenance, and cost analysis. 3 lectures, 1 laboratory.

AE 143 Power and Machinery (4)

Performance of tractors and machinery. Evaluation of tillage, planting, and harvesting operations. Analysis and development of optimum mechanical systems. 3 lectures, 1 laboratory.

AE 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

AE 228 Cotton Ginning (4)

Cotton fiber production, cultural practices, harvesting methods and equipment; cleaning, drying and ginning methods including survey of equipment, its use and management; fiber quality measurements, packaging, storing and selling cotton products. 3 lectures, 1 laboratory.

AE 231 Agricultural Building Construction (3)

Development of practical skills in carpentry and light construction. Selection of materials. Agricultural buildings repaired, constructed, or modified during laboratory periods. 1 lecture, 2 laboratories. Prerequisite: AE 121 or AE 128

AE 232 Agricultural Structures Planning (3)

Environmental factors affecting crop storage structures and animal housing. Insulation, heating, ventilation, water supply, and waste disposal. Functional planning of production systems. 2 lectures, 1 laboratory. Prerequisite: Phys 132 and college drafting.

AE 234 Agricultural Power Transmission (3)

Elements of the transmission, measurement and utilization of power in agriculture. Problem solution, engineering reports, graphical studies, pumping machinery and engine cycles. 2 lectures, 1 laboratory. Prerequisite: AE 142

AE 236 Principles of Irrigation (4)

Operation and evaluation of irrigation systems and methods, land grading, land grading equipment. Principles of farm irrigation system design; water delivery and water rights. 3 lectures, 1 laboratory. Prerequisites: Math 142, SS 121, AE 237

AE 237 Engineering Surveying (2)

Selection, care and use of tapes, levels and transits. Keeping field notes; land measurement by tape; differential and profile leveling, and the plotting of profiles. Introduction to the transit; field operation; introduction to traverses. 1 lecture, 1 field period. Prerequisite: Math 115 or equivalent; college drafting.

Ag Engineering

AE 238 Engineering Surveying (2)

Use of the transit: traverses, coordinates, triangulation, area and balanced survey calculations. Cross sections, landgrading, and volumes. Topographic and contour by stadia-transit mapping. 1 lecture, 1 field period. Prerequisite: AE 237

AE 239 Engineering Surveying (2)

Parabolic curves, circular curves, cross sectioning, setting slope stakes, measuring earth volume, cuts and fills as applied to road beds, public land surveys, photogrammetry. 1 lecture, 1 field period. Prerequisite: AE 238

AE 240 Agricultural Engineering Laboratory (1-2)

Total credit limited to 4 units with no more than 2 units in any one quarter. 1 or 2 laboratories

AE 301 Closed Circuit Hydraulics (3)

Proper selection and maintenance of machine components using standardized design procedures and manufacturer's design literature. 2 lectures, 1 laboratory. Prerequisite: AE 234 or 312

AE 302 Agricultural Waste Management (3)

Scope of the agricultural pollution problem; standard methods of measuring pollution; water quality; nutrient budget studies; management of animal wastes; management of pollution by crop residue, fertilizers, herbicides, and pesticides; legal and political aspects of pollution. 3 lectures. Prerequisite: Chem 122, junior standing

AE 312 Hydraulics (4)

Static and dynamic characteristics of liquids, flow in open and closed channels, uniform and non-uniform flow, flow measurement, pumps. 2 lectures, 2 activity periods. Prerequisite: Phys 132, ME 211

AE 315 Hydrology (3)

Collection, organization and use of precipitation and runoff data, flood frequency and economics of structures, stream gauging and use of hydrograph, principles of groundwater management and flood routing. 3 lectures. Prerequisite: Math 141

AE 320 International Agricultural Mechanization (3)

Agricultural mechanization abroad. Farm machinery design in Europe and Japan. Traditional farming methods and tools in tropics. Problems of agricultural mechanization in developing countries. Agricultural engineering education, research and extension in various developed and developing countries. 3 lectures. Prerequisite: AE 142 or 143

AE 321 Agricultural Equipment Industry Management (4)

Management and operation of the farm equipment industry. Study of sales, service, parts and product education policies on manufacturer, distributor and dealer level. 3 lectures, 1 laboratory. Prerequisite: AE 142

AE 322 Principles of Agricultural Machinery (3)

Principles and evaluation of agricultural power units and machines. Soil-equipment mechanics and tractor-implement combinations. 2 lectures, 1 laboratory. Prerequisite: AE 142

AE 323 Agricultural Products Handling (3)

The application of product handling techniques and equipment to the processing of agricultural commodities. 2 lectures, 1 laboratory. Prerequisite: Math 114 or consent of instructor

AE 324 Principles of Agricultural Electrification (3)

Power distribution and DC and AC circuit fundamentals. Principles of wiring layout. Materials, code regulations and electrical measurements applicable to various agricultural uses. 2 lectures, 1 laboratory. Prerequisite: Phys 123

AE 325 Agricultural Electric Power and Controls (3)

Electric power applications in agriculture. Motors, heat, controls, protective devices for motors and circuits, electrical distribution of power. 2 lectures, 1 laboratory. Prerequisite: AE 324 or consent of instructor

AE 326 Off-the-Road Locomotion (3)

Sources and systems for supplying power to off-the-highway vehicles. Theory of traction, soil equipment mechanics, prime mover and implement combinations. 2 lectures, 1 laboratory. Prerequisite: AE 143, ME 302

AE 327 Agricultural Process Engineering (3)

Thermodynamics and mass transfer principles applied to air, water, air-water mixtures, drying, heating, refrigeration, fluid flow, size reduction, fan laws and materials handling. 2 lectures, 1 laboratory. Prerequisite: AE 312 and ME 302

AE 328 Multiple Use Water Management (4)

Water occurrence, quality and measurement. Water conservation and treatment. Multiple use of water in private, local, state and federal projects. 3 lectures, 1 laboratory. Prerequisite: AE 131, 345

AE 329 Tropical Rural Development (4)

Economic considerations, traditional methods and techniques, available materials, analysis of low cost improved equipment. Market road system planning and construction. Water supply and sanitation, low cost rural housing, food storage and farm structures. 2 lectures, 2 laboratories.

AE 330 Agricultural Environment Control (2)

Current research findings on optimum environment for agricultural production. Structures and equipment used to control animal and plant environment. 1 lecture, 1 laboratory. Prerequisite: Junior standing in Agriculture and permission of instructor

AE 331 Irrigation Theory (3)

Plant-water-soil relations using evapo-transpiration, plant stress, soil moisture deficiency, frequency and depth of irrigation, salinity, principles of soil-water-plant relations using saturated and unsaturated flow, soil aeration, infiltration, and drainage. 3 lectures. Prerequisite: SS 121, Math 141

AE 332 Agricultural Buildings (3)

Selection of buildings, storage units, and related equipment for production agriculture. Environmental factors affecting crop storage and animal housing. Farmstead layouts. Working drawings and cost estimates. 2 lectures, 1 laboratory. Prerequisite: Junior standing and a course in drafting.

AE 333 Engineering Properties of Agricultural Materials (3)

Principles of analyzing the mechanical, electrical, thermal, rheological and optical characteristics of agricultural materials. 2 lectures, 1 laboratory. Prerequisite: Aero 207, Phys 133

AE 335 Agricultural Power (3)

Principles of spark ignition and compression ignition engines, including liquefied petroleum gas equipment, and related accessories. Service, trouble-shooting and repair procedures of engines and transmissions. 2 lectures, 1 laboratory.

AE 336 Agricultural Power Analysis (3)

Selection and application of internal combustion engines. Theory of combustion, fuels, and lubricants; power and its measurement. Factors affecting horsepower output and engine efficiency. Advanced power transmission, electrical systems. 2 lectures, 1 laboratory. Prerequisite: AE 335, Phys 123

AE 337 Irrigation, Drainage and Grading Practices (3)

Survey of irrigation and drainage systems and basic grading, earth shaping and retention practices. 2 lectures, 1 laboratory. Prerequisite: AE 237

Ag Engineering

AE 338 Dynamic Measurement (3)

Engineering measurements and basic instrumentation. Transducers, signal processors, output devices and controls used in agricultural engineering. 2 lectures, 1 laboratory. Prerequisite: EE 201

AE 339 Agricultural Mechanics Skills (3)

Advanced shop skills. Carpentry, electricity, plumbing, surveying, power mechanics, tractor equipment operation and maintenance. 1 lecture, 2 laboratories. Prerequisite: Junior standing.

AE 340 Irrigation Water Management (4)

Soil-plant-water relationships, consumptive use rates and irrigation schedules, water quality, salinity and drainage; evaluations of irrigation methods, water rights and irrigation institutions. Flow of water in pipes and canals, water measurement, wells, and pumps. 3 lectures, 1 laboratory.

AE 341 Gasoline Engine Diagnosis (3)

Use of modern engine testing equipment in the evaluation of engine components and accessories such as: cylinder condition, ignition systems, electrical systems, and fuel systems. 2 lectures, 1 laboratory. Prerequisite: AE 335 or equivalent

AE 342 Diesel Fuel Systems (3)

Use of modern test and service equipment in evaluating and servicing diesel fuel systems. 2 lectures, 1 laboratory. Prerequisite: AE 335 or equivalent

AE 343 Project Analysis (4)

Analysis of projects for structural design, applied elements of statics, dynamics, strength of materials, fabrication, and fasteners. 3 lectures, 1 laboratory. Prerequisite: ET 141 or equivalent

AE 344 Agricultural Equipment Projects (3)

Construction of special agricultural equipment related to any agricultural enterprise. 1 lecture, 2 laboratories. Prerequisite: AE 343.

AE 345 Aerial Photogrammetry (3)

Object recognition, three-dimensional equipment, and interpretation. Print alignment, stereoscopic viewing, scales, elevation determination, and application. Familiarization with geological, agricultural, land and crop management, engineering surveys, construction data, topographic detail, drainage elevation and control. Color photo techniques and uses for pest and disease location and control. 2 lectures, 1 laboratory. Prerequisite: Math 103 or 114

AE 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems in agriculture. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

AE 403 Agricultural Systems Engineering (3)

Engineering principles combined with mathematical optimization techniques to evaluate parameters in agricultural production and processing systems. 3 lectures. Prerequisite: IE 414, Math 242, Engr 251

AE 414 Irrigation and Drainage Engineering (4)

Design of farm and project irrigation and drainage systems. Influence of soils, crops, climate, and costs on the frequency, rate, and duration of economical water delivery. Pipeline and ditch distribution systems; reservoirs, pumps, and drains; economics of systems and components. 3 lectures, 1 laboratory. Prerequisite: AE 236, 312, 331

AE 421 Equipment Engineering (3)

Design and construction of specialized agricultural equipment. 1 lecture, 2 laboratories. Prerequisite: Aero 207, ME 212, WM 142

AE 422 Equipment Engineering (3)

Analysis and design of equipment with emphasis on man-machine-plant-automata relationships and concepts. 2 lectures, 1 laboratory. Prerequisite: AE 421

AE 425 Utility-Industrial Equipment (4)

Cost analysis of utility and industrial equipment with emphasis on management, selection, operation and maintenance. Evaluation of performance of bulldozers, earth-moving equipment, cranes, air compressors and rigging. 3 lectures, 1 laboratory. Prerequisite: Actg 131

AE 433 Agricultural Structures Design (3)

Structural analysis and design of agricultural service and processing buildings. Emphasis on use of wood and metals in light construction. 2 lectures, 1 laboratory. Prerequisite: AE 232, Aero 207

AE 434 Reinforced Concrete (3)

Mechanics of reinforced concrete; working stress and ultimate strength. Design of beams, columns, floor systems, foundations and retaining walls. 2 lectures, 1 laboratory. Prerequisite: AE 433

AE 437 Conservation Engineering (4)

Engineering and management practices to conserve soil and water resources. Check dams, terraces and water storage dams; strip and cover cropping, contour tillage; applications of soil mechanics, hydraulics, and hydrology to design of erosion control structures; flow nets, tractive force hydraulics, and geology. 3 lectures, 1 laboratory. Prerequisite: AE 312, 315, 334

AE 439 Agricultural Mechanics—Facility Management (3)

Major factors and techniques in planning, organizing and managing agricultural mechanics instruction shops and facilities. For students preparing to teach agriculture. 2 lectures, 1 laboratory. Prerequisite: minimum of 8 units of Agricultural Engineering and Welding & Metallurgical courses.

AE 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

AE 463 Undergraduate Seminar (2)

Group discussion of current agricultural engineering topics presented by individual members of the class. Topics or papers presented by guest speakers. Placement opportunities and requirements. 2 lectures.

AE 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

AE 500 Individual Study (1-3)

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Prerequisite: Graduate standing and consent of instructor.

AE 521 Engineering of Agricultural Equipment (4)

Agricultural machinery analyzed from the mechanical, operational, and economic standpoint. Emphasis on optimum harvesting systems. 3 lectures, 1 laboratory. Prerequisite: Graduate standing and consent of instructor.

AE 522 Agricultural Processes Engineering (4)

Engineering principles involved in handling, conditioning and storage of agricultural products. Advanced practical analysis and design of agricultural systems from harvest to utilization. 3 lectures, 1 laboratory. Prerequisite: Graduate standing and consent of instructor.

Ag Management

AE 532 Water Resources Institutions and Planning (4)

Philosophical, institutional, and legal aspect of water resources. Relationship of development of water resources to development of other natural resources. Local, state and federal role in water resource development and planning. 3 lectures, 1 laboratory. Prerequisite: NRM 302, graduate standing and consent of instructor

AE 533 Advanced Irrigation System Design (4)

Design and economic evaluation of complex sprinkler and surface irrigation systems. Current advancements in equipment and theory. Project design. 3 lectures, 1 laboratory. Prerequisite: Graduate standing and consent of instructor.

AE 581 Graduate Seminar in Agricultural Engineering (3)

Group study of current engineering problems and recent developments as they relate to agriculture. Problem identification, statement and research methodology are emphasized in problem solution. 3 seminars.

AE 599 Engineering Report (2) (2) (5)

Directed study with limited supervision of important, practical engineering problem-solving. Preparation of a comprehensive report. Total credit limited to 9 units with maximum of 5 units per quarter. Prerequisite: consent of instructor.

AGRICULTURAL MANAGEMENT

AM 101 Introduction to Agribusiness (3)

Survey of Agricultural Businesses; introduction and orientation to the Agricultural Management Department and the college; careers in public and private agricultural businesses and service agencies; changes and growth of agriculture, with emphasis on California. 3 lectures

AM 102 Introduction to Agricultural Economics (3)

Introduction to the economic aspects of agricultural management. The role of agricultural resources in economic growth. Survey of trade, policy, and marketing activities of agriculture. 3 lectures.

AM 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

AM 212 Agricultural Economics (3)

Changes in agriculture and agricultural production in response to changing economic conditions. Optimum methods of agricultural production. Impact of technological change. Evaluating market structure and price formulating factors for agricultural products and inputs. 3 lectures. Prerequisite: Ec 211

AM 250 Computer Application to Agriculture (2)

Use of "library" programs available for agriculture and auxiliary equipment available at commercial computer centers. Automated record keeping systems. Statistical and other computer programs applied to agricultural problems. 2 activities.

AM 304 Agricultural Marketing (3)

Application of economic principles to the marketing of agricultural commodities. Market channels with emphasis on futures trading, market information, storage, and transportation. Implications of the foreign market to agriculture with emphasis on the effect on California production. 3 lectures. Prerequisite: Ec 201 or 211

AM 310 Agricultural Credit and Finance (3)

Credit management of agricultural businesses in production, processing, and distribution of agricultural products and services. Financial procedures and problems in agribusiness. 3 lectures. Prerequisite: One quarter of accounting or permission of the instructor.

AM 339 Agribusiness Management Internship (12)

The selected student will spend one quarter with a selected agribusiness. This period of time will be spent applying and developing managerial skills and abilities. Prerequisite: Consent of instructor

AM 409 California Agricultural Law (3)

Legal structures, property taxation, condemnations, laws affecting cooperatives and other farm and farm related agricultural businesses. 3 lectures. Prerequisite: Bus 301 and senior standing.

AM 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

AGRICULTURE

Ag 201 Agriculture and American Life (3)

Relationship of agriculture and natural resources to man and his society. Impact of soil, water, and land uses on animal and crop production within the United States. Relative importance of resources used and commodities produced. Not open to students with majors in agriculture and natural resources. 3 lectures.

ANIMAL SCIENCE

A Sci 101 Feeds and Feeding (4)

Simple use of food nutrients. Identification and classification of feeds for each class of livestock. The digestion and utilization of feeds. Feeding standards and computation of simple rations for livestock. Economy in feeding and purchasing feeds by nutritive values. 3 lectures, 1 laboratory.

A Sci 111 Market Beef Production (3)

Breeds, market classes, and grades of beef cattle. Selection of feeder cattle. Management practices in purchasing and fattening cattle using farm grown feeds. Study of cattle feeding operations carried on at the college. Marketing of beef cattle. 3 lectures. Prerequisite: A Sci 101

A Sci 112 Elements of Swine Production (3)

History, development and importance of swine industry. Types, breeds, market classes and grades of swine. Basic principles and practices of swine feeding and management. 3 lectures.

A Sci 113 Elements of Sheep Production (3)

Survey of the types of sheep operations in California. Breed study, market classes, and grades identification. Commercial fattening of lambs in dry lot and irrigated pasture programs. Calendar of operations for the various types of sheep enterprises. 3 lectures.

A Sci 131 Basic Equitation (3)

Grooming, saddling, bridling, mounting, seat and hands. Horsemanship both under saddle and bareback. Basic care of the horse. Study of types of horse gear and equipment. Designed to teach basic riding to students with no previous experience. Advanced sign-up with instructor required. 1 lecture, 2 laboratories.

A Sci 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

A Sci 211 Commercial Beef Management (3)

Care and management of a breeding herd of commercial cattle in California. Range and farm lands suited to beef production. Factors affecting cost of production. Improvement of breeding herd. Trends in the industry. 3 lectures. Prerequisite: A Sci 101, 111

Animal Science

A Sci 212 Swine Management (3)

Management practices involved in commercial and purebred swine enterprises. Methods of production and marketing, performance testing programs and carcass evaluation techniques. Nutritional requirements, rations, diseases and parasites, facilities and equipment. 3 lectures. Prerequisite: A Sci 101, 112

A Sci 213 Sheep Management (3)

Detailed study of managerial practices for both commercial and purebred sheep enterprises. Performance testing and carcass evaluation techniques. The preparation and merchandising of the wool clip. Introduction to wool processing. 3 lectures. Prerequisite: A Sci 101, 113

A Sci 226 Livestock Evaluation (3)

Utilization of objective and subjective estimation measures in establishing economic worth of domestic animals of the three meat animal species and horses. 1 lecture, 2 laboratories.

A Sci 229 Range Management (4)

Characteristics of rangeland, identification of range plants, management practices to maintain range resources and increase production of forage and livestock. 3 lectures, 1 laboratory. Prerequisite: SS 121, A Sci 121 or 230, a botany or crops science course.

A Sci 230 General Animal Science (4)

For non-animal science majors. Selection, feeding, and management of sheep, swine, and cattle, and their uses on California farms. 3 lectures, 1 laboratory.

A Sci 232 Elements of Horse Management (4)

Status of the horse industry. Breeds of horses and their uses. Anatomy and parts of the horse, horse judging. Study of good and faulty conformation. Unsoundnesses, ailments and their treatment. Determination of age. Early history of the horse. 3 lectures, 1 laboratory. Prerequisite: A Sci 101.

A Sci 234 Horseshoeing (2)

Fundamentals of horseshoeing, anatomy and physiology of the horse's foot, pastern, and legs. Trimming feet, fitting and nailing shoes. Normal shoeing, corrective shoeing. 1 lecture, 1 laboratory combined.

A Sci 241 Applied Beef Cattle Practices (2)

Application of operational practices in the purchasing, management, and marketing of beef cattle. Equipment, preventive veterinary practices, live animal evaluation, performance records, carcass evaluation, and ranch evaluation. 1 lecture, 1 activity.

A Sci 242 Applied Swine Management Practices (2)

Application of operational practices in the management and merchandising of swine. Housing and equipment, routine veterinary practices, live animal evaluation, performance evaluations, farrowing and post-farrowing practices, and carcass appraisal. 1 lecture, 1 activity.

A Sci 243 Applied Sheep Management Practices (2)

Flock management; sheep handling techniques; breed evaluation; preparation for exhibition; internal and external parasite control; tagging, shearing, foot trimming; selection; culling and identification. Marking techniques. Wool grading and judging. Market lamb and carcass evaluation. 1 lecture, 1 activity.

A Sci 302 Applied Animal Nutrition (3)

Feedstuff evaluation and analysis. Advancements in feedstuff evaluation and application to ration formulation. Principles and practices in livestock ration formulation. Linear programming principles as applied to computer formulated rations. 2 lectures, 1 laboratory. Prerequisite: A Sci 101, Chem 226.

A Sci 304 Animal Breeding (3)

Application of genetics to the improvement of farm animals. Improving production through a study of mating systems including outbreeding, inbreeding, selection techniques, performance testing and evaluating, herd records, indexing and progeny testing. Setting up and organizing improved breeding programs using modern techniques and equipment. 3 lectures. Prerequisite: Bio 303

A Sci 323 Beef Husbandry (4)

Purebred cattle business including selection of foundation stock, herd bulls; breeding programs; pedigrees; facilities and equipment; feeding breeding herd, sale cattle, show cattle; marketing purebred cattle; and general management problems. 3 lectures, 1 laboratory. Prerequisite: A Sci 101, 211, 221

A Sci 326 Advanced Livestock Evaluation (2)

Application of deductive and inductive logical processes in appraising the relative merit of individual animals within a group sample. Oral expression of the selection rationale. 2 laboratories. Prerequisite: A Sci 226

A Sci 332 Range Technology (4)

Fundamentals of rangeland survey and inventory. Application of ecology in range evaluation. Analysis of range condition and capacity. Development of plans for effective improvement and utilization of rangeland. 3 lectures, 1 laboratory. Prerequisite: A Sci 229

A Sci 333 Horse Husbandry (4)

Management of the breeding farm. Farm layout. Inheritance, pedigrees, diseases, breeding problems, nutrition, study of estrous cycles, and servicing the mare. Handling stallions. Sale preparation. Breeding and feeding records, office procedure, selection of breeding stock. 3 lectures, 1 laboratory. Prerequisite: A Sci 232

A Sci 334 Feed Mill Operation (4)

Study of general operation of a feed mill including a survey of the industry, buying, storing, grinding, weighing, mixing, packaging, handling, and delivery of formula feeds. Also a study of flow of materials, preventive maintenance and safety in a mill. 3 lectures, 1 laboratory. Prerequisite: A Sci 101

A Sci 335 Range Livestock Economics (3)

Economic structure of the range livestock industry; economics of rangeland use; factors affecting income and costs of range operations; ranchland values; capital and credit for range enterprises; range conservation relationships with ranch operators. 3 lectures. Prerequisite: Junior standing and A Sci 229

A Sci 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Prior permission of department head.

A Sci 401 Reproductive Physiology (4)

Intensive study of reproductive efficiency of farm animals. Anatomy and physiological factors involved in reproduction. Male and female systems, pregnancy, estrual behavior, semen collection and evaluation, artificial insemination, pregnancy testing, and hormone therapy. 3 lectures, 1 laboratory. Prerequisite: VS 123

A Sci 402 Animal Nutrition (4)

The metabolism of proteins, carbohydrates, fats, minerals, and vitamins. Relationship of proper nutrition to livestock production. 3 lectures, 1 laboratory. Prerequisite: A Sci 302, Chem 328

A Sci 426 Live Animal and Carcass Evaluation Techniques (2)

Relationship between live meat animal evaluation and carcass evaluation. Visual appraisal techniques used in the evaluation and analysis of live meat-type animals related to the selection and grading techniques of carcasses. 2 laboratories. Prerequisite: A Sci 226, FI 212

Anthropology

A Sci 434, 435 Specialized Horse Enterprises (3) (3)

Early schooling of the young horse through advanced training. Use of the snaffle bit, hackamore, half-breed and Spanish bits. Gentling and ground work. Training in collection, turning, backing, leads, trailer loading, rope work, cattle work. Advanced sign-up with instructor required. 1 lecture, 2 laboratories. Prerequisite: A Sci 333 or appropriate experience.

A Sci 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

A Sci 463 Undergraduate Seminar (2)

Major developments in the chosen field of the student. Discussion of new developments, policies, practices, and procedures. Each individual is responsible for the development and presentation of a topic in his chosen field. 2 lectures.

A Sci 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

A Sci 504 Ruminant Nutrition (4)

Concentrated study of ruminant nutrition. The physiological and biochemical aspects of digestion, absorption, and metabolism. Significance of rumen micro-organisms related to energy, protein, and vitamin metabolism. Current research techniques employed in ruminology. 3 lectures, 1 laboratory. Prerequisite: A Sci 101, 402

A Sci 580 Seminar in Animal Nutrition (3)

Current findings and problems in the field of animal nutrition. Effects of new experimental research on the livestock industry. 3 lectures.

A Sci 581 Graduate Seminar in Animal Production (3)

Current findings and research problems in the field and their application to the industry. 3 lectures.

ANTHROPOLOGY

Ant 201 Cultural Anthropology (3)

The meaning and significance of culture to human beings. Examination of how cultures differ in their impact on behavior. How cultures develop and change. 3 lectures.

Ant 202 World Prehistory (3)

The development of human cultures in both the Old and New Worlds from the earliest times until the dawn of history; cultural growth. 3 lectures.

Ant 203 Physical Anthropology (3)

Facts and problems of human evolution; fossil man; primate evolution and social behavior; human variation. 3 lectures.

Ant 301 Applied Anthropology (3)

Survey and interpretation of the central cultural characteristics of North Americans. Analysis of misunderstandings which develop as a result of divergent value systems, ethical codes, patterns of etiquette and linguistic psychology when persons meet and attempt to function across cultural barriers. 3 lectures. Prerequisite: Ant 201

Ant 341 Comparative Societies (3)

Comparative study of contemporary peoples and cultures representing the major cultural types. 3 lectures. Prerequisite: Ant 201

ARCHAEOLOGY

Ar 301 California Archaeology (3)

The California Indians; field studies in locating, surveying, and analyzing aboriginal sites; excavation of a site; laboratory techniques for recording, preserving, and reporting of artifacts; relating observations and finds to the natural environment in which a site is located. Integrating knowledge of natural and social sciences to use of archaeology. 2 lectures, 1 laboratory.

ARCHITECTURE

Arch 106 Materials of Construction (3)

The use and application of building materials, structural makeup of buildings. 3 lectures.

Arch 201 Encountering Architecture (3)

A concise history of Architecture, Landscape Architecture, and City Planning for non-architecture majors. 3 lectures.

Arch 231, 232 Architectural Practice (3) (3)

Introduction to construction techniques and working drawings. Theory and application of laws and codes affecting buildings. Working drawings as communication instruments. 3 laboratories. Prerequisite: Arch 106 or consent of school.

Arch 234 Architectural Practice (6)

Covers material in Arch 231, 232. Primarily for transfer students. Partial credit may be granted. 6 laboratories. Prerequisite: Arch 106 or consent of school.

Arch 237, 238 Architectural Photography (2) (2)

Photographic and presentation techniques applicable to architectural subjects. 1 lecture, 1 laboratory. Prerequisite: EDes 110, Jour 221 or consent of instructor.

Arch 240 Additional Architectural Laboratory (1-2)

Total credit limited to 4 units with not more than 2 units in any one quarter. 1 or 2 laboratories.

Arch 241, 242, 243 Watercolor (1) (1) (1)

Outdoor sketching with watercolor. 1 laboratory. Prerequisite: Permission of instructor.

Arch 213, 214, 215 Advanced Delineation (2) (2) (2)

Development of proficiency in architectural presentation. Projects and critiques. 2 laboratories. Prerequisite: EDes 112

Arch 247 Form and Materials (2)

Design explorations with architectural ceramics, metals, plastics, wood and stone. Total credit limited to 6 units, not more than 2 units in any one quarter. 2 laboratories. Prerequisite: EDes 110, 111

Arch 301, 302 History of Non-Western Architecture (3) (3)

Ancient American, Far Eastern and Central Asian periods of architecture; philosophies and conditions which influenced them. For architects and others. 3 lectures. Prerequisite: Junior standing in the College.

Arch 308, 309 Building Systems Design (3) (3)

Environmental systems and equipment available to the architect to make architectural spaces structurally, mechanically and esthetically functional. Engineering and design analysis, system comparisons, cost-benefit studies of building equipment. 3 lectures. Prerequisite: EDes 203, Arch 232

Arch 310 Introduction to Systematic Design Methods (3)

Architectural problem solving by means of system design methods. Use of computers and modern decision making techniques as environmental design aids. 3 lectures. Prerequisite: Third year standing in School of Architecture and Environmental Design or permission of instructor.

Architecture

Arch 312 Home and Community Design (3)

For students not majoring in architecture. Historical development of the home and city and the effect of location, climate, social and technological factors on homes and cities. Considerations and design methodology; furniture, landscape, and relation of home to community environment. 3 lectures.

Arch 317, 318, 319 History of Architecture (3) (3) (3)

Periods of architecture; philosophies and conditions which influenced them. 3 lectures. Prerequisite: Engl 104

Arch 320 Color and Environment (2)

Theory and systemization of visible spectrum as it applies to architectural environment. Includes visual and psychological effects of color. Exercises pertain primarily to interior design. 1 lecture, 1 laboratory. Prerequisite: EDes 203, Psy 202

Arch 321 Photography of Historic Structures (2)

Photographic techniques used in the documentation of historic sites and structures. Emphasis on use of the camera as a recording instrument. 1 lecture, 1 laboratory. Prerequisite: Basic skills and consent of instructor.

Arch 322, 323 Model Analysis (2) (2)

Development of structural understanding by non-mathematical methods through the observation of models under load conditions. Introduction to model techniques of stress determination. 1 lecture, 1 laboratory. Prerequisite: ArcE 206

Arch 324 Architectural Acoustics (2)

Design of hearing conditions in architectural spaces; sound distribution and diffusion; properties of structures and surface materials; room shapes as affecting acoustics with architectural considerations paramount. 2 lectures. Prerequisite: Phys 132, EDes 203

Arch 325, 326 Architectural Lighting (2) (2)

Influence of natural and artificial light on space, form, the human being and his architectural environment. Design of artificial lighting environments, sources of illumination, effects on textures, colors, illusions and moods, reflectance, absorption, glare control, diffusion and distribution, lighting economics, analysis of fixtures, controls, 1 lecture, 1 activity. Prerequisite: Phys 133 or 137 and Junior standing.

Arch 341, 342, 343 Architectural Practice (2) (2) (2)

Continuation of Arch 232. Theory and application of specifications and cost control procedures. Coordination with architectural laboratory. 2 laboratories. Prerequisite: Arch 232, EDes 203. Concurrent: Arch 351, 352, 353

Arch 347, 348, 349 Design for Planners (3) (3) (3)

Three dimensional design with emphasis on spatial relationships and urban forms. The physical city. Effect of color, texture and scale, open spaces. Landscaping and architecture. 3 laboratories. Prerequisite: CRP 212, EDes 101, 110, 112, 203

Arch 351, 352, 353 Architectural Design (4) (5) (5)

Development of logical analysis and creative abilities through application of skills to the solution of architectural problems. 4 or 5 laboratories. Prerequisite: EDes 101, 110, 112, 203, ArcE 206

Arch 357 Industrial Presentation Techniques (2)

Graphic presentation for industrial engineers. Symbols, techniques, and freehand drawing. Construction drawings and flow diagraming. 2 laboratories.

Arch 358 Industrialized Buildings (2)

History, theory and application of factory fabricated building systems. Materials and techniques, creative design by such methods. 1 lecture, 1 laboratory. Prerequisite: Junior standing

Arch 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

Arch 404 Environmental Testing and Evaluation (3)

Evaluation and testing of buildings, neighborhoods, new towns, urban renewal and rehabilitation projects. Systematic analysis of in-use facilities as input data for programming new facilities. 2 lectures, 1 laboratory. Prerequisite: Fourth year standing or consent of instructor.

Arch 417, 418, 419 History of Architecture (2) (2) (2)

Arch 319 continued. Periods of architecture; philosophies and conditions which influenced them. 2 lectures. Prerequisite: Arch 319

Arch 433 Construction Specifications (2)

Methods of developing construction specifications, their use and value. ASTM, Federal specifications, and manufacturer's catalogs as informational sources. 1 lecture, 1 activity. Prerequisite: 4th year standing.

Arch 441, 442, 443 Professional Practice (2) (2) (2)

Comprehensive projects in architecture involving office organization. Contract documents. Ethics. Drawings for buildings with coordinated engineering and specifications. Field trips. 2 activities. Prerequisite: Arch 343, ArcE 305

Arch 451 Architectural Design (5)

Continuation of Arch 353. Problems of increasing architectural complexity with emphasis placed on comprehensive solutions. 5 laboratories. 15 units required, no more than 5 units per quarter. Prerequisite: Arch 343, Arch 353, ArcE 305, Math 143, Phys 133 or 137

Arch 458 Computer Applications in Spatial Design (2)

Organization, analysis and optimization of three dimensional spaces using digital computer. Application of logic to spatial design decisions. Use of problem oriented languages and survey of current field applications. 2 activities. Prerequisite: Math 143, EDes 250, 4th year standing.

Arch 461, 462 Senior Project (2) (2)

Selection and completion of a comprehensive type project under faculty supervision. Problems will involve students' technical and creative skills. Construction encouraged. 120 hours minimum total time. Prerequisite: Senior standing

Arch 465 Housing Seminar (3)

Survey of urban housing in the industrial age; qualitative analysis of aspects of planning the individual unit and the position of housing units within the urban fabric; problems of housing rehabilitation; investigation of criteria for programming housing; examination of organizational forms of housing; housing needs in various population groups. 3 lectures. Prerequisite: Soc 313 and 4th year standing.

Arch 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

Arch 523 Urban Design Analysis (3)

Analysis of cities based on visual design excellence. Compositional qualities of form, space, light, materials and color. Spatial sequencing and imageability qualities. 1 lecture, 2 laboratories. Prerequisite: Graduate standing.

Arch 531 Habitability (3)

Habitability standards and concepts significant for architectural design and practice. Behavioral analysis of habitats, facilities and urban systems. Design and development of structures and systems responsive to human needs. Habitability and environmental specifications, human factors, human engineering, behavioral sciences. 3 lectures. Prerequisite: Graduate standing; consent of instructor.

Architecture

Arch 532 Environmental Research and Development (2)

Objective expression of tasks, operational planning and situation estimates, data banks, literature searches, observation, report preparation, FDA protocol, individual, team, and project discipline in interdisciplinary tasks, patent disclosures, records and work narratives, program proposals, scope-time-cost estimating for research and development. 2 lectures. Prerequisite: Graduate standing.

Arch 541 Design Methodology (3)

Design information systems. Logical systems of ordering design information. Selection and definition of environmental design strategies. Variety generation: the morphological approach, associational techniques, value-based idea production techniques, role of intuitive judgment in systematic design methods. Computer-aided design techniques. Variety reduction: performance production and in-use testing. Economic and non-economically based evaluation techniques. 3 lectures.

Arch 551 Architectural Design (5)

Professional initiative and responsibility in integrating architectural design theory and practice with fields influencing the total environment. Building types considered as the coordinating factor. Total credit limited to 15 units with not more than 5 units in any one quarter. 5 laboratories. Prerequisite: Graduate standing.

Arch 561 Advanced Design (5)

Continuation of Arch 551. Advanced studies integrating architectural design theory and practice with fields influencing the shaping of the total environment. 10 units required, no more than 5 units per quarter. 5 laboratories.

Arch 563 Professional Seminar (2)

Problems and topics in the field of the architectural profession. Seminar drawn upon expertise of visiting professionals in addition to topics presented by regular faculty and students. 2 meetings. Prerequisite: Consent of instructor, graduate standing.

Arch 571, 572, 573 Design Project (2) (2) (2)

A comprehensive architectural design project chosen by the student which will challenge his technical, creative and organizational abilities. Project to involve community or field contact on a team basis. Construction or projects involving other disciplines encouraged. 2 laboratories. Prerequisite: Arch 532.

Arch 580 Seminar in Theory of Architecture (3)

Directed group study of selected topics in the theory of architecture for graduate students. Class schedule will list specific topics selected. May be repeated to 9 units. 3 meetings. Prerequisite: Consent of instructor, graduate standing.

Arch 590 Seminar in Design Analysis (3)

Directed group study of methods of analysis of architectural subjects. Class schedule will list specific area of focus. May be repeated to 9 units. 3 meetings. Prerequisite: Consent of instructor, graduate standing.

Arch 599 Thesis Project (4) (5)

Completion of a project embodying original research and/or demonstrating individual creative ability in an area of environmental design. Prerequisite: Consent of graduate adviser, consent of graduate committee. Arch design 561 (10 units) and Arch 571.

ARCHITECTURAL ENGINEERING

ArcE 205, 206 Strength of Materials (3) (3)

Physical properties of construction materials. Moment and shear diagrams; axial and eccentric loading; deflection. Sizing of structural members of homogeneous and compound materials. 3 lectures. Prerequisite: Phys 131, Math 142 or consent of school.

ArcE 207 Strength of Materials (6)

Covers material in ArcE 205, 206. Primarily for transfer students. Partial credit may be granted. 6 lectures. Prerequisite: Phys 131, Math 142 or consent of school.

ArcE 304 Stress Analysis (3)

Stress analysis of statically determinate and indeterminate structures. 3 lectures. Prerequisite: ArcE 206 or consent of school.

ArcE 305 Building Structural Systems (3)

Types of structural systems. Total systems response to gravity and lateral loads, with emphasis on structural system adaptability to various building types. 3 lectures. Prerequisite: ArcE 304, Math 143, EDes 203

ArcE 344 Stress Analysis Laboratory (1)

Standard tests of structural materials and structural components. Use of test equipment and strain gages. 1 laboratory. Prerequisite: ArcE 206

ArcE 346 Computer Analysis of Structure (2)

Solution of structural problems using existing programs. Creation of mathematical models from physical problems and solution by digital computer. 2 activities. Prerequisite: Arch 250, ArcE 305

ArcE 356 Advanced Materials of Construction (3)

Materials behavior under stress-strain conditions. Examination of causes and effects. Wood, concrete, steel, aluminum, plastics, individually and combination. Relationships between microscopic and macroscopic structure and properties. 2 lectures, 1 laboratory. Prerequisite: Arch 106, ArcE 344

ArcE 361, 362, 363 Design Analysis for Engineers (4) (4) (4)

Studies in building design with emphasis on aesthetics and structural system efficiency. Development of logical analysis and creative abilities in structural design. Form development of the structural concept, joinery, method of communication, including working drawings and code requirements. Use of reinforced concrete, masonry, and steel. 4 laboratories. Prerequisite: Arch 232, ArcE 206, EDes 203

ArcE 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ArcE 401 Steel and Timber Structures (5)

Design of structural steel and timber members and their connections. Two and three dimensional steel building frames and timber building systems under dead, live, moving, wind and seismic load conditions. Elastic and plastic design concepts. Timber systems utilizing glued laminated members, stress skin panels, box beams, trusses and panelized systems. 5 lectures. Prerequisite: ArcE 305, or permission of instructor.

ArcE 406 Reinforced Concrete and Masonry Structures (3)

Elements and design of reinforced concrete and masonry structures for gravity and lateral loads. 3 lectures. Prerequisite: ArcE 305 or consent of instructor, Math 143

ArcE 407 Plastic Design of Steel Structures (3)

Theory of plastic design, structural engineering methods used to design steel frameworks with plastic theory. 3 lectures. Prerequisite: ArcE 404

Architectural Engineering

ArcE 408 Prestressed Concrete (3)

Analysis and design of prestressed concrete beams, columns, slabs, composite sections and special problems in prestressed concrete. 3 lectures. Prerequisite: ArcE 406 or 444

ArcE 409 Survey of Foundation Engineering (3)

Fundamentals of foundation engineering, evaluation of soil reports, principles of determination of bearing capacity, soil classification, selection of types of foundations, evaluation of expansive properties of foundation soils, discussion of basic laboratory tests. 3 lectures. Prerequisite: ArcE 206

ArcE 411 Matrix Analysis of Structures (3)

Analysis of structural systems by matrix algebra techniques primarily applicable to solution by digital computers. 3 lectures. Prerequisite: EDes 250, ArcE 304, Math 143

ArcE 412 Dynamics of Framed Structures (3)

Analysis of stresses and deflections in structures subjected to dynamic loads. Emphasis is on matrix algebra development primarily applicable to solution of problems by digital computer. 3 lectures. Prerequisite: EDes 250, ArcE 304, Math 143

ArcE 413 Design of Concrete Plate and Shell Structures (3)

Design of slabs. Principles of ultimate strength, limit design, and yield-line theories. Design of folded plate roof structures. Membrane theory for thin shells. Application to shells of revolution, barrel shells and hypar shells. Applications of prestressing and precasting. 3 lectures. Prerequisite: ArcE 406 or 444 or permission of instructor.

ArcE 421 Soil Mechanics (3)

Principles and application of soil mechanics, including rudiments of geology, soil classification, gravimetric and volumetric relations, compaction methods and testing, embankments and fills, bearing capacities. Introduction to foundation design. 2 lectures, 1 laboratory. Prerequisite: Math 241, Phys 133 or consent of School.

ArcE 422 Soil Mechanics and Foundations (3)

Additional principles of soil mechanics and application to design of foundation systems for buildings, bridges, and retaining walls. Consolidation of soils, ground water, drains and filters, shear strength, theory of soil strength; active and passive pressure, foundation investigations. 2 lectures, 1 laboratory. Prerequisite: ArcE 421

ArcE 423 Advanced Foundation Engineering (3)

Analysis of foundation systems for large buildings, bridges, etc. Evaluation of test results, model analysis, special topics relative to foundation engineering, advanced work in triaxial testing, pore pressure effects, and slope stability analysis. 2 lectures, 1 laboratory. Prerequisite: ArcE 422 or 424

ArcE 424 Soil Mechanics and Foundations (6)

Covers material in ArcE 421, 422. Primarily for transfer students. 4 lectures, 2 laboratories.

ArcE 426 Experimental Stress Analysis (3)

Stress determination by model analysis. Brittle coatings, photoelastic methods and strain gauges. Advanced topics. 2 lectures, 1 laboratory. Prerequisite: ArcE 444

ArcE 431, 432, 433 Design Analysis for Engineers (2) (2) (2)

Design analysis of Architectural Engineering structures including problems in the application of thermodynamics, fluid statics, dynamics, flow in pipes and open channels, specifications, contracts, engineering economics, and engineering studies including feasibility and alternate problem analysis. 2 activities. Prerequisite: ArcE 363, 401, 406

ArcE 444, 445, 446 Structural Design (5) (5) (5)

Stress analysis of long-span structures, arches, influence lines, built-up girders, multiple-storied rigid frame structures, prestressed concrete, shells and domes. Dams and bridges. Advanced topics from current engineering practice. One designated field trip required. 5 laboratories. Prerequisite: ArcE 344, 363, 401, Math 242, CSc 331

ArcE 461, 462 Senior Project (2) (2)

Selection and completion of a comprehensive type project under faculty supervision. Problems to involve the students' technical and creative skills. Construction encouraged. 120 hours minimum total time. Prerequisite: Arch 343

ArcE 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

ArcE 481 Advanced Materials Testing Laboratory (2)

Advanced laboratory work in testing structural materials and systems, including high strength concrete, reinforced concrete and prestressed concrete structural components, scaled concrete frames, micro concrete models, and structural models of timber, steel and plastics. 2 laboratories. Prerequisite: ArcE 406 or 444, 344

ArcE 482 Seismic Analysis (3)

Analysis of structural response to seismic forces applied to building structural systems, structural models and structural components of single-degree and multi-degrees of freedom, elastic and inelastic. 2 lectures, 1 laboratory. Prerequisite: ArcE 412, 445

ArcE 504 Finite Element Method for Building Structures (3)

Basic concepts of equilibrium and compatibility; stiffness and flexibility properties of various types of finite elements. Development and application of displacement and force methods. Elastic stability and dynamic response of buildings to earthquake, wind, and moving loads. Use of finite-element computer programs. 3 lectures. Prerequisite: Math 242, ArcE 446, or permission of instructor.

ArcE 505 Numerical Methods in Structural Engineering (3)

Basic concepts in numerical methods: Finite differences, successive approximations, iterative and relaxation procedures. Applications to building and bridge structures: Analysis of beams, columns, frames, arches, plates and shear walls under static, impact and dynamic loadings. 3 lectures. Prerequisite: CSc 331, ArcE 446, or permission of instructor.

ART

Art 201 Fundamentals of Drawing (3)

Analysis and practice in functional drawing, basic design, and study of form. Development of individual techniques. 3 activity periods.

Art 202 Intermediate Drawing (2)

Development of additional drawing techniques with emphasis on form and composition. 2 activity periods. Prerequisite: Art 201

Art 205 Applied Color and Design (3)

Study of lines, planes, masses, textures, color, and aspects of space as elements in the structure of the plastic arts. Balance, rhythm, and proportion of any two or more of these elements as utilized in the fine and applied arts. Experience in simple media. 3 activity periods. Prerequisite: Art 231 or consent of instructor.

Art 211, 212 Art History (4) (4)

The chronological study of the significant art and artists in world history. In addition to painting and sculpture, considerable emphasis will be given to the applied arts of each period. 4 lectures.

Art

Art 221, 222, 223 Design Fundamentals (3) (3) (3)

Exploration of basic graphic design theory and practice. Two dimensional concepts, three dimensional concepts, and color concepts introduced in successive quarters. 3 activities.

Art 231 Introduction to Art (3)

Designed to further understanding of painting, sculpture and graphic arts. Development of vocabulary and useful criteria for evaluation. 3 lectures.

Art 232 Orientation to Art Materials (3)

Manipulation and experimentation with a wide variety of art media and techniques. Evaluation of expressive and design qualities in group and individual projects. 3 activity periods.

Art 233 Orientation to Crafts (3)

Basic experiences in three dimensional processes in contemporary crafts with clay, metal, wood and other materials. Creative statement and development of personal design concepts. 3 activity periods.

Art 255 Functions of Design (2)

Survey of design in areas pertinent to the environment. Lecture-discussion related to current design trends. Involvement of the individual in his environment. 2 lectures.

Art 314 American Art (2)

Development of art in any one or more of the ethnic groups or cultures within the western hemisphere. Course will bear a descriptive subtitle. 2 lectures. May be repeated to a total of 6 units. Prerequisite: Art 211, 212 or permission of the instructor.

Art 316 Non-Western Art (2)

Development of art in any one or more of the non-western ethnic groups or cultures. Course will bear a descriptive subtitle. 2 lectures. May be repeated to a total of 6 units. Prerequisite: Art 211 or 212 or permission of the instructor.

Art 324, 325, 326 Intermediate Crafts (2) (2) (2)

Further development of craft techniques in ceramics, metal, leather, wood, and other craft materials. Skill development, material handling, and current methods of applied design. 2 activities. Prerequisite: Art 233, or consent of instructor.

Art 331, 332, 333 Applied Design (3) (3) (3)

Investigation and experimentation in art structure, color and design. Relation of aesthetic concepts to practical two and three dimensional problems in advertising, packaging, display and exhibits. Lettering skill will be emphasized. 3 laboratories. Prerequisite: Art 223 or permission of the instructor.

Art 340, 341 Painting Techniques (2) (2)

Physical characteristics of painting media, creative understanding of pictorial space and color. Sequence courses. 2 laboratories. Prerequisite: Art 205, or consent of instructor.

Art 345 Advanced Drawing (3)

Development of methods and techniques in the figurative study of form and structure. Emphasis on relating drawing to individual solutions of problems. 3 activities. Prerequisite: Art 201 and consent of instructor.

Art 346, 347 Sculpture (3) (3)

Introduction to the elements of three dimensional form through the exploration of sculptural techniques. Technical problems in modeling, casting, carving, welding, and other techniques of assembly. Sequence courses. 3 activities.

Art 348 Metalsmithing (3)

Experience in design and creation of jewelry, small sculpture and hollowware. Classroom work in copper, brass, silver and gold includes cutting, forming, joining, embellishing and casting techniques. 3 activities. Prerequisite: Art 324 and consent of instructor.

Art 349 Ceramics (3)

Introduction to ceramic materials and processes; design, slab, coil and wheel forming, glazing; related instruction and evaluation. 3 activities. Prerequisite: Art 233 or consent of instructor.

Art 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Senior standing and consent of instructor.

Art 421 Curriculum and Instructional Procedures in Art (3)

Content, organization and scope of art curriculum in elementary and secondary schools. Evaluation of teaching approaches and procedures that encourage creativity in the arts. 3 lectures.

Art 425 Contemporary Art (3)

Artists and art movements of the modern era with an emphasis on the 20th century. 3 lectures. Prerequisite: Junior or senior standing.

Art 431, 432, 433 Graphic Design (3) (3) (3)

Laboratory problems in practical advertising design with emphasis on mass media, page layout, and related areas. Contemporary trends in graphic design. 3 laboratories. Prerequisite: Art 333 or permission of the instructor.

Art 446 Advanced Ceramics (3)

Advanced clay construction, decorating, glazing and firing with emphasis on the use of the potter's wheel. Development of appropriate design. Ceramic theory as a basis for criticism. 3 activities. Prerequisite: Art 349

Art 447 Advanced Metalsmithing (3)

Development of design concepts, projects, and skills to a high level of competency. 3 activities. Prerequisite: Art 348 and consent of instructor.

Art 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

ASTRONOMY AND ASTROPHYSICS

Astr 101 Introduction to the Solar System (3)

Descriptive astronomical properties of the earth, moon, other planets and their satellites. Comets, asteroids and other members of the solar system. Theories of the formation of the solar system. Opportunities for telescope observations of the moon and planets. Not open to students who have completed or are taking Astr 311, 312, or Phys 131. 3 lectures.

Astr 102 Introduction to Stars and Galaxies (3)

Descriptive astronomical properties of the sun, stars, galaxies, and interstellar material. The expanding universe and cosmological models. Opportunities for telescope observations and star identification. Not open to students who have completed or are taking Astr 311, 312, or Phys 131. Astr 101 is not a prerequisite. 3 lectures.

Bacteriology

Astr 311 The Solar System (3)

Quantitative and descriptive properties of the solar system including the physics of the planets, their satellites, comets and interplanetary media; possible origins of the solar system. 3 lectures. Prerequisite: Phys 132 or 123

Astr 312 Stars and Galaxies (3)

Quantitative and descriptive properties of the stars, galaxies and interstellar media; including stellar structure and evolution, structure and make-up of galaxies and cosmological models. 3 lectures. Astr 311 is not a prerequisite. Prerequisite: Phys 131

Astr 351 Observational Astronomy (1)

Practical observing experience using stellar coordinate systems to locate and photograph celestial objects with the telescope. Application of photographic, photo-electric, and spectrographic techniques to astronomical problems. 1 laboratory. Prerequisite or concurrent: Astr 311 or 312 or consent of instructor.

BACTERIOLOGY

Bact 221 General Bacteriology (4)

Morphology, metabolism, classification and identification; bacteriology of air, soil, water, and foods with applications to industry, agriculture, medicine, and public health. 2 lectures, 2 laboratories. Prerequisite: One quarter of college chemistry or Bot 121 or Zoo 131

Bact 224 General Microbiology (4)

Introduction to the biology of micro-organisms. Structure, physiology, genetics, and ecology. For majors in biological sciences and others desiring an introduction to the subject. 2 lectures, 2 laboratories. Prerequisite: Chem 226, Bact 221 or both Bot 121 and Zoo 131

Bact 322 Dairy Bacteriology (4)

Advanced course for practical work demonstrating the domestic and industrial importance of micro-organisms involved in milk and dairy products: milk, milk powders, fermented milks, evaporated and condensed milks, butter, cheese, cheese starters, and ice cream. 2 lectures, 2 laboratories. Prerequisite: Bact 221

Bact 333 Industrial Microbiology (4)

Sanitary and industrial applications of microbiology stressing food, dairy, water, air and sewage; practical aspects of environmental sanitation emphasized. 2 lectures, 2 laboratories. Prerequisite: Bact 221

Bact 342 Sanitary Inspection and Control (2)

Domestic and commercial contamination, epidemiology, stressing practical applications of hygienic practices and methods of correcting and eliminating health hazards. 2 laboratories. Prerequisite: Bact 221

Bact 402 General Virology (3)

Characteristics and classification of animal viruses. Methods for collection of specimens, cultivation and identification of pathogenic viruses. 3 lectures. Prerequisite: Bact 221

Bact 421 Food Microbiology (4)

Physiological activities of microorganisms involved in the preparation, preservation, deterioration and toxicity of foods and related products. Sanitary and public health implications. 2 lectures, 2 laboratories. Prerequisite: Bact 221. Recommended: Chem 226

Bact 423 Public Health Microbiology (4)

Detailed study of pathogenic yeasts, molds, viruses, and bacteria in relation to public health. 2 lectures, 2 laboratories. Prerequisite: Bact 221

Bact 424 Bacterial Cytology and Physiology (4)

Cellular structure and life processes of bacteria; chemical composition, growth and metabolism. General biological implications. 3 lectures, 1 laboratory. Prerequisite: Bact 221, Chem 226. Recommended: Chem 328

Bact 436 Marine Microbiology (4)

Harmful and beneficial marine bacteria and allied microorganisms. Role played by marine microorganisms as biochemical, geological and hydrobiological agents. 2 lectures, 2 laboratories. Prerequisite: Bact 221

Bact 590 Seminar in Bacteriology (1)

Problems and topics in advanced bacteriology selected according to the interest and needs of the students enrolled. Maximum of 3 units. Prerequisite: Graduate status and evidence of satisfactory preparation in bacteriology.

BIOLOGY

Bio 100 Agricultural Biology (3)

Basic biological principles applied to agriculture. This course may not be substituted for General Zoology or General Botany. 2 lectures, 1 demonstration and discussion hour. Not open to degree students for degree credit.

Bio 101 General Biology (3)

Principles of cellular biology, heredity, ecology, and evolution, with emphasis on their relationship to human affairs. Not open to students who have completed Bot 121 or Zoo 131. 3 lectures.

Bio 102 Plant Biology (3)

Structural and functional aspects of plants, with emphasis on seed producers. Not open to students who have completed Bot 121. 3 lectures. Prerequisite: Bio 101

Bio 103 Animal Biology (3)

Structural and functional aspects of animals, with emphasis on man. Not open to students who have completed Zoo 131. 3 lectures. Prerequisite: Bio 101

Bio 127 Natural History (3)

Scope of natural history; formation and identification of features in the physical environment; natural history survey of arachnids, myriapods, and insects. 1 lecture, 2 laboratories.

Bio 128 Natural History (3)

Natural history survey of the plant and animal kingdom; field study and identification of marine intertidal organisms. 1 lecture, 2 laboratories.

Bio 129 Natural History (3)

Principles of field biology and ecology; laboratory and field study of wildflowers, land communities, and freshwater communities; emphasis is on California natural history. 1 lecture, 2 laboratories. Prerequisite: Bio 128

Bio 255 Microtechnique (2)

Methods of preparing plant and animal tissues for microscopic study with emphasis on paraffin embedding techniques and staining. 2 laboratories. Prerequisite: Bot 122 or Zoo 132

Bio 301 Human Ecology (3)

Examination of the ways in which man is dependent on his environment, his ability to modify it, and the results of such modification. 3 lectures. Prerequisite: One quarter of biological science.

Bio 303 Genetics (3)

Principles of heredity and variation. 3 lectures. Prerequisite: one quarter of college biology and one quarter of college mathematics.

Biology

Bio 304 Advanced Genetics (2)

Recent advances in genetics and cytogenetics. 2 lectures. Prerequisite: Bio 303

Bio 313 Radiation Biology (2)

Interaction and effect of radiation on living cells and organisms. Review of production and characteristics of non-ionizing and ionizing radiation, isotope characteristics useful in the study of bio-systems, health hazards, and health safety problems. 2 lectures. Prerequisite: Chem 122 or 124 and one of the following: Bio 101, Bot 121, Zoo 131

Bio 315 Evolution (2)

Modern concepts of evolutionary mechanisms. 2 lectures. Prerequisite: Bio 303

Bio 321 Biological Instrumentation (3)

Theory and operation of instruments commonly used in biological investigation 1 lecture, 2 laboratories. Prerequisite: Bot 121, Zoo 131 or Bio 129

Bio 325 General Ecology (3)

Study of the interrelationships between plants and animals and their environment in terrestrial, marine, and freshwater situations. 2 lectures, 1 laboratory. Prerequisite: Bio 129 or both Bot 122 and Zoo 132

Bio 328 Marine Biology (4)

Biological and environmental studies of marine organisms, with emphasis on their economic importance. 2 lectures, 2 laboratories. Prerequisite: Bio 129 or both Bot 122 and Zoo 133, or consent of instructor.

Bio 331 Biosystematics (3)

Major principles of classification, taxonomy, speciation, and nomenclature. Designed primarily for biology majors. Term report required. 2 lectures, 1 laboratory. Prerequisite: Ent 126, Bio 129 or both Bot 123 and Zoo 133

Bio 334 Freshwater Ecology (3)

Physical, chemical, and biological factors of freshwater environments as they relate to freshwater organisms. 2 lectures, 1 laboratory. Prerequisite: one year college biology, one quarter college chemistry.

Bio 343 Radiation Laboratory Techniques (2)

Demonstrations and exercises in the use of radioisotopes and the operation of radiation detecting instruments. 2 laboratories. Prerequisite: Bio 313 (may be taken concurrently).

Bio 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of the department head.

Bio 423 General Cytology (4)

Detailed study of the structure and function of animal and plant cells. 3 lectures, 1 laboratory. Prerequisite: Bio 303 and either Zoo 133 or Bot 123

Bio 424 Electron Microscopy (3)

Biological applications of electron microscopy including techniques of specimen preparation, design of experiments, interpretation of results and limitations. 1 lecture, 2 laboratories. Prerequisite: Zoo 131, Bot 121 or instructor's consent.

Bio 431 General Physiology (4)

The functioning, control, and integration of physiological phenomena at various levels from cell to organism. 2 lectures, 2 laboratories. Prerequisite: Chem 226; Bot 122 or Zoo 132

Bio 437 Marine Resources (4)

Present and potential biological and physical resources of the sea with consideration of means for their best utilization. Identification and ecology of pertinent organisms. 3 lectures, 1 laboratory. Prerequisite: Bot 122 and Zoo 133

Bio 442 Quantitative Biology (4)

Design of biological experiments with emphasis on sampling methods, data collection, mensuration, and analysis of field and laboratory data. 3 lectures, 1 laboratory. Prerequisite: One year of biology and Stat 212 or 321

Bio 461, 462 Senior Project (2) (2)

Projects are selected from typical problems which graduates may meet in areas of their future employment. Results are presented in both oral and written reports. Minimum 120 hours total time.

Bio 463 Undergraduate Seminar (2)

Study and discussion of recent developments in the field of biology. 2 meetings. Prerequisite: Senior standing.

Bio 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

Bio 500 Individual Study (1-3)

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Prerequisite: Graduate standing and consent of instructor.

Bio 515 History of Biology (3)

Critical survey of the historical development of experimental designs for the solution of biological problems. 3 lectures. Prerequisite: Graduate standing.

Bio 521 Curriculum and Methods in Biological Sciences (3)

Objectives, content, techniques, materials, and recent trends of successful instruction in secondary school biology. 3 lectures. Prerequisite: Graduate standing; evidence of satisfactory preparation in biology, botany and zoology.

Bio 524 Developmental Biology (3)

Developmental phenomena of higher and lower plants, vertebrate and invertebrate animals at the molecular, cellular, histological and organ levels. Each quarter will emphasize a different biological description. 3 units per quarter. May be repeated to a maximum of 9 units. 2 lectures, 1 laboratory. Prerequisite: Graduate standing and evidence of satisfactory preparation in biology.

Bio 527 Cell Physiology (4)

Functional organization of cells, their environment, and energy metabolism. Laboratory exercises in dynamic aspects of cell physiology. 2 lectures, 2 laboratories. Prerequisite: Graduate standing and Chem 328, Math 114, Bio 431

Bio 542 Multivariate Biometry (4)

Design of biological experiments involving multivariate observations. Experimental design, sampling, computer analysis, and interpretation of results. 3 lectures, 1 laboratory. Prerequisite: Stat 313, Bio 442

Bio 570 Selected Topics in Biology (1-3)

Directed group study of selected topics for graduate students. Class schedule will list topics for selection. Total credit limited to 9 units. Lectures and/or laboratories. Prerequisite: Graduate standing and evidence of satisfactory preparation in biology.

Biology/Botany

Bio 590 Seminar in Biology (1)

Problems and topics in advanced biology selected according to the interest and needs of the students enrolled. Maximum of 3 units. 1 lecture. Prerequisite: Graduate status and evidence of satisfactory preparation in biology.

Bio 599 Thesis (3) (3) (3)

Individual research under the general supervision of the staff, leading to a graduate thesis of suitable quality. Prerequisite: Graduate standing and consent of instructor.

BOTANY

Bot 121 General Botany (4)

Introduction to structures and functions of seedbearing plants. 2 lectures, 2 laboratories.

Bot 122 General Botany (4)

Structure and relationships of plant groups from bacteria to angiosperms, emphasis on nonseedbearing plants of economic importance. 2 lectures, 2 laboratories. Prerequisite: Bot 121

Bot 123 Introductory Plant Taxonomy (4)

Introduction to classification and identification of vascular plants, emphasizing the families of major economic importance; field and herbarium techniques. 2 lectures, 2 laboratories. Prerequisite: Bot 121

Bot 238 Native Plant Materials (3)

Identification, habits of growth, cultural requirements and landscape use of native California plants suitable for landscape purposes. 2 lectures, 1 laboratory. Prerequisite: Bot 123

Bot 322 Introductory Plant Physiology (4)

A consideration of the principal physiological processes of plants including water relations, mineral nutrition, photosynthesis, respiration, and growth of the plant. 3 lectures, 1 laboratory. Prerequisite: Bot 121 and Chem 226

Bot 323 Plant Pathology (4)

Comprehensive study of the causes and effects of disease in plants. Designed to lead to an understanding of the science and modern control methods. 2 lectures, 2 laboratories. Prerequisite: Bot 122 or Bot 123

Bot 325 Plant Nematology (4)

Plant parasitic nematodes, their morphology, classification, and the damage they cause plants, alone or in combination with other pathogens. 2 lectures, 2 laboratories. Prerequisite: Bot 323, Ent 126

Bot 326 Plant Ecology (4)

Effects on plant growth and development of the following environmental factors: soil, water, temperature, light, atmosphere, topography, organisms, and fire. 3 lectures, 1 laboratory. Prerequisite: Bot 123

Bot 334 Morphology of Vascular Plants (4)

Phylogenetic relationships of the plant kingdom as illustrated by comparative morphology of the vascular plants including living and fossil forms. 2 lectures, 2 laboratories. Prerequisite: Bot 123

Bot 335 Plant Anatomy (4)

Microscopic study of vascular plants dealing with the origin, development and structure of cells, tissues and organs. 2 lectures, 2 laboratories. Prerequisite: Bot 122

Bot 337 Algology (4)

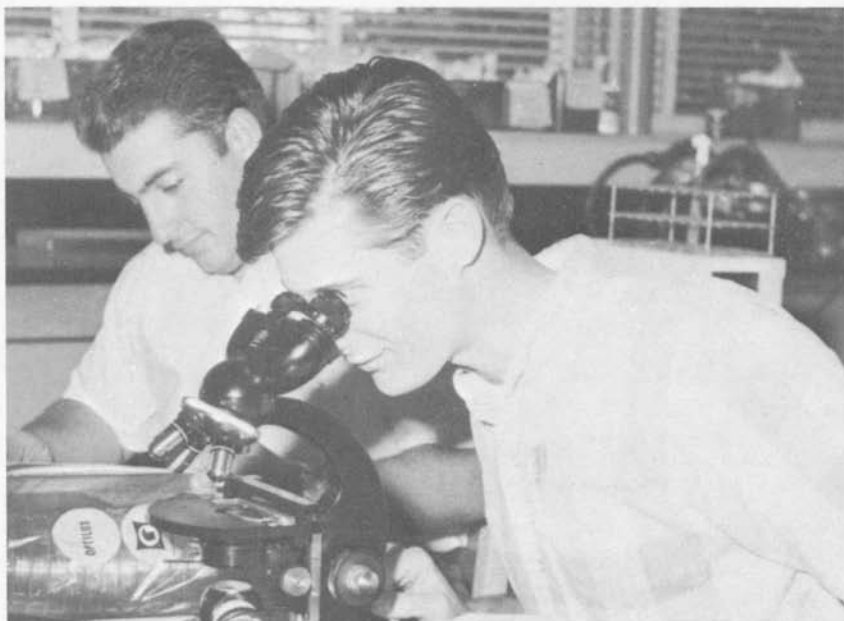
Classification of marine and fresh-water algae. Consideration of ecological, physiological and economic aspects. 2 lectures, 2 laboratories. Prerequisite: Bot 122

Bot 343 Advanced Plant Taxonomy (3)

Systems of plant classification and principles on which they are based; use of morphology, cytogenetics, and ecology in classification; rules of botanical nomenclature. 2 lectures, 1 laboratory. Prerequisite: Bot 123

Bot 425 Plant Virology (4)

Plant pathogenic viruses, their plant, insect, nematode and fungal host-pathogen relationships, symptom recognition, isolation and identification methods. 2 lectures, 2 laboratories. Prerequisite: Bot 323, Ent 227



Bot 426 Mycology (4)

Comparative morphology and nuclear behavior of the fungi. A summary of the science with special attention given to forms important in agriculture, medicine and industry. 2 lectures, 2 laboratories. Prerequisite: Bot 122, Zoo 132, or consent of instructor.

Bot 433 Advanced Plant Physiology (4)

Advanced topics in plant physiology. Substructure and function of plant cell walls, cell walls as barriers against infection, plant cell enzymes and cell membranes, plant metabolism, cell wall extension, pigment systems. Application of physiology to taxonomic problems and disease resistance. 2 lectures, 2 laboratories. Prerequisite: Bot 322 or equivalent.

Bot 531 Advanced Plant Pathology (4)

Relationships of plant hosts with their parasites. Methods and materials used in diagnosis of plant diseases and in plant disease research. 2 lectures, 2 laboratories. Prerequisite: Bot 323

Bot 590 Seminar in Botany (1)

Problems and topics in advanced botany selected according to the interest and needs of the students enrolled. Maximum of 3 units. 1 lecture. Prerequisite: Graduate status and evidence of satisfactory preparation in botany.

BUSINESS

Bus 101 The Business Enterprise (4)

Orientation to the Business Administration program. Examination of the business enterprise, stressing its historical, environmental, and economic setting. Business organization and functions. 4 lectures.

Bus 141 Typing (1)

Designed to teach the fundamentals of the touch system in the shortest time. Training in making out business forms and writing business letters. 3 one-hour periods.

Bus 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

Bus 201 Business Law Survey (3)

An overview of the field of business law patterned to needs of non-majors. Scope is the same as for Bus 207, though in less depth. Not applicable for credit in Business Administration curriculum. 3 lectures. Prerequisite: Sophomore standing or consent of instructor.

Bus 207 Business Law (4)

The American legal system, contracts (agency, sales, negotiable instruments), real and personal property, business organizations, insurance and creditor's remedies. 4 lectures.

Bus 321, 322 Business Applications of Data Processing (3) (3)

Programming the computer using current, user-oriented symbolic language appropriate to typical business applications. Systems analysis. Systems and program flow charting. Data input, storage, processing, and output media and techniques. 2 lectures, 1 two-hour laboratory. Prerequisite: CSc 140 or ability to program in COBOL; Actg 131 or 221 or consent of instructor.

Bus 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Senior standing or consent of instructor.

Bus 404 Government Regulation of Business (4)

Development of legal controls of business in the context of a free enterprise system. Problems in constitutional and administrative law. Government control for the protection of the employee, consumer, investor and the public. 4 lectures. Prerequisite: Bus 201 or 207.

Bus 419 Business Research (3)

Information gathering principles and techniques used in study and analysis of business activities. 3 lectures. Prerequisite: Mgt 413.

Bus 460 Senior Project (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Formal report is required. Required minimum of 60 hours. Prerequisite: Bus 419

Bus 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

BUSINESS ADMINISTRATION

BA 500 Independent Study (1-3)

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Prerequisite: Consent of the department head.

BA 501 Accounting for Planning and Control (3)

Application of accounting to management planning, control and information systems. Case and problem analysis in budgetary control, standard and direct costing, decentralized profit control, inter-division transfers, and long-range planning. 3 lectures. Prerequisite: BA 510 or equivalent.

BA 506 Business and Society (3)

Modern business organization as a quasi-economic, legal-social entity including examination of widely held views, philosophical and ethical considerations, conceptual foundations, and customer-employee-government-stockholders-public interrelationships. 3 lectures. Prerequisite: Bus 201 or equivalent.

BA 508 Marketing Management I (3)

Detailed analysis of marketing management, policy planning or strategy formulation, organizing, directing and coordinating marketing activities. 3 lectures. Prerequisite: Mktg 204 or equivalent.

BA 509 Marketing Management II (3)

Application of quantitative and qualitative tools, introduced in previous quarters of the integrated program, to marketing problems. 3 lectures. Prerequisite: BA 508 or consent of instructor.

BA 510 Foundations in Accounting (4)

Principles and practices of fundamental accounting. Introduction to cost accounting and financial statement analysis. 4 lectures. Prerequisite: Graduate standing.

BA 511 Micro-Economics (3)

Analysis of production, demand, supply, costs, market structures, factor pricing, and policy decision making by business firms and consumers. 3 lectures. Prerequisite: Ec 212 or equivalent.

BA 512 Macro-Economics (3)

Analysis of aggregative economics. Theories of income, output, employment; growth of the economy; economic policies. 3 lectures. Prerequisite: Ec 212 or equivalent.

BA 513 Operations Management (3)

Application of analytical tools to problems in operations and production systems. Emphasis on models and techniques in operations planning and control and systems design for management. 3 lectures. Prerequisite: BA 527 or equivalent.

BA 518 Labor Relations in the Public Sector (3)

History of labor relations at the federal-state-local level. Comparative relations between union organizations, policies, and practices within the public and private sectors. Emphasis will be placed on current issues. 3 lectures. Prerequisite: BA 584 or consent of instructor.

BA 520 Foundations in Finance (2)

Problems of financing current and fixed assets from internal and external sources. Emphasis on analysis, planning and control. 2 lectures. Prerequisite: Graduate standing.

BA 522 Money and Capital Markets (3)

Capital markets and non-bank financial intermediaries. Factors that affect supply, demand, and interest rates in these markets. 3 lectures. Prerequisite: BA 511 or consent of instructor.

Chemistry

BA 525 Business Finance (3)

Complex issues and models related to financial management and policy. Problems in capital budgeting, optimal financial structure, working capital management, and financing dynamic growth; case analysis and simulation to correlate theory and application. 3 lectures. Prerequisite: BA 501 and 511 or equivalent.

BA 527 Quantitative Methods I (3)

Applications of mathematical and statistical techniques to business and economic problems of broad significance to management. Case analysis and numerical solution by computer. 3 lectures. Prerequisite: Math 540 and Stat 540 or equivalent and consent of instructor.

BA 528 Quantitative Methods II (3)

Additional specialized business problems. Optimization of probabilistic processes and analysis of risky decisions using appropriate mathematical and statistical techniques. Case analysis, numerical solution and simulation by computer. 3 lectures. Prerequisite: BA 527 or equivalent and consent of instructor.

BA 530 Foundations for Management (3)

Examination of major theories and conceptual ideas relating to the nature and behavior of formal organizations; historical development of organizational theory and structure. Current issues. 3 lectures. Prerequisite: Graduate standing in the MBA Program.

BA 581, 582, 583 Seminar in Applied Decision Making (4) (4) (4)

Problem definition and management decision making. Case analysis, demonstrations, simulations, role playing, and management games aimed at integrating and synthesizing material in the graduate curriculum. Application of analytical tools. Human resources implications. Dynamic functional and environmental factors. 4 meetings. Prerequisite: Graduate standing in the MBA Program.

BA 584 Seminar in Human Resources Management (3)

Class discussion and selected readings relating to the management of people in organizations. Manpower policy, behavioral science research, utilization of minority and hard-core personnel, industrial relations ramifications. 3 meetings. Prerequisite: BA 530 or equivalent.

CHEMISTRY

Chem 106 Introductory Chemistry (3)

Metric system, density, chemical symbols, chemical formulas, nomenclature, kinetic-molecular theory, chemical equations, gas laws, the concept of the mole, molarity, normality and stoichiometric calculations. An introductory course in chemistry, not open to students who have credit for a college chemistry course. 3 lectures. Prerequisite: Math 103 or equivalent.

Chem 121 General Inorganic Chemistry (4)

Fundamental principles including atomic structure, bonding, nomenclature, chemical equations, states of matter, solutions, some non-metals. Not open to students with credit for Chem 124. 3 lectures, 1 laboratory. Prerequisite: Chem 106 or equivalent or recommendation of faculty adviser.

Chem 122 General Inorganic Chemistry (4)

Electrochemistry, equilibria, non-metals with application to fertilizers, colloids, an introduction to metals and nuclear chemistry. Not open to students with credit for Chem 125. 3 lectures, 1 laboratory. Prerequisite: Chem 121

Chem 124 General Chemistry (4)

General principles including atomic structure, nuclear chemistry, and oxidation-reduction. Primarily for engineering majors. Not open to students with credit for Chem 121. 3 lectures, 1 laboratory. Prerequisite: Chem 106 or equivalent or recommendation of faculty adviser.

Chem 125 General Chemistry (4)

Continuation of Chem 124. Introduction to the carbon compounds emphasizing fuels and synthetic polymers. Not open to students with credit for Chem 122. 3 lectures, 1 laboratory. Prerequisite: Chem 124

Chem 126 General Chemistry (4)

Chemical equilibria, compounds of the metals, qualitative analysis of the metal ions in the laboratory. 3 lectures, 1 laboratory. Prerequisite: Chem 122 or 125

Chem 143 General Chemistry Laboratory (1)

Additional laboratory to be taken with Chem 126. Includes semi-micro qualitative study of the nonmetals. 1 laboratory. Prerequisite: Chem 122 or 125

Chem 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

Chem 226 Organic Chemistry (4)

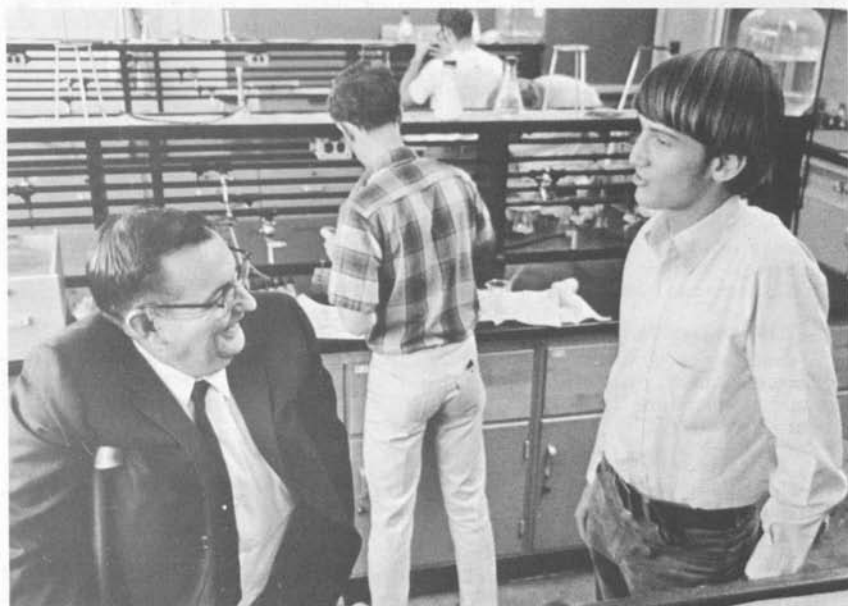
The fundamental concepts of organic chemistry with applications to agricultural and industrial processes. 3 lectures, 1 laboratory. Prerequisite: Chem 122 or 125

Chem 305 Physical Chemistry (3)

Physical and molecular constitution of gases; kinetic theory; atomic structure; elementary chemical thermodynamics and thermochemistry; chemical statistics; introduction to phase equilibria. 3 lectures. Prerequisite: Phys 123 or 133, Chem 125 or 126, Math 131 or 141

Chem 306 Physical Chemistry (3)

Phase equilibria, solutions; distillation theory; colligative properties; electrochemistry with analytical applications; non-ideal systems, chemical kinetics, radioactivity. 3 lectures. Prerequisite: Chem 305



Chemistry

Chem 313 Chemical Process Principles (3)

Fundamental terms, concepts, and principles used in the chemical processing industries. 3 lectures. Prerequisite: Chem 226 or consent of the instructor.

Chem 327 Organic Chemistry (5)

A more complete study of the types of organic compounds along with some reaction mechanisms. The laboratory is largely organic preparation. 3 lectures, 2 laboratories. Prerequisite: Chem 226

Chem 328 Biochemistry (4)

Fundamental chemistry of carbohydrates, proteins, fats, vitamins, enzymes and hormones as applied to their function in plant and animal metabolism. Special reference to the chemistry involved in the use, analysis and manufacture of feeds, foods and other agricultural products. 3 lectures, 1 laboratory. Prerequisite: Chem 226

Chem 329 Biochemistry (4)

Applied cellular biochemistry, nucleic acids, protein synthesis, virus, molecular geometry, antimetabolites, antibiotics, hormones, pharmacodynamics and laboratory animal techniques. 3 lectures, 1 laboratory. Prerequisite: Chem 328

Chem 331 Quantitative Analysis (4)

Analytical techniques of industrial significance stressing titrimetric procedures in the laboratory based on acidimetry, alkalimetry and redoximetry. Applications of chemical equilibrium and methods of problem solving. 2 lectures, 2 laboratories. Prerequisite: Chem 126

Chem 332 Quantitative Analysis (4)

Analytical techniques stressing procedures based upon titrimetric precipitrimetry, gravimetric analysis and continuation of redoximetry. Properties of precipitates and colloids as applied to industrial analytical chemistry. 2 lectures, 2 laboratories. Prerequisite: Chem 331

Chem 334 Chemistry of Drugs and Poisons (3)

Chemical constitution, biologic action and metabolism of naturally occurring and synthetic drugs and poisons. Medico-legal considerations, drug metabolism and toxicology. 3 lectures. Prerequisite: Chem 328

Chem 335 Quantitative Physiological Chemistry (3)

Quantitative determination of metabolites in biological fluids. Medical laboratory techniques in analysis of serum, blood and urine for glucose, nitrogenous substances, electrolytes, hormones, enzymes; blood gas analysis and blood pH determination. 1 lecture, 2 laboratories. Prerequisite: Chem 328

Chem 336 Quantitative Physiological Chemistry (4)

Theory of biochemical techniques in clinical chemistry and pathology, metabolic and organic specific investigations and interpretation of results, clinical instrumentation. 3 lectures, 1 laboratory. Prerequisite: Chem 335

Chem 338 Organic Chemistry (5)

A continuation of Chem 327, including carbohydrates, sulfur compounds, heterocyclic compounds, natural products, stereochemistry, steroids, reaction mechanisms, organic preparations in the laboratory. 3 lectures, 2 laboratories. Prerequisite: Chem 327

Chem 342 Laboratory Glassblowing (1)

Techniques of glassblowing applied to the making of simple laboratory apparatus. 1 laboratory. Prerequisite: Chem 121 or 124

Chem 343 Qualitative Organic Analysis (4)

The experimental determination of the identity of organic compounds. Special reference to those compounds used in agriculture. 1 lecture, 3 laboratories. Prerequisite: Chem 327

Chem 351 Biophysical Chemistry (4)

Physical methods for studying biological systems. Principles of thermodynamics as applied to living systems and cellular organelles. Kinetic molecular theory, application of gas laws, osmotic work and ion activities in solutions. Not open to students with credit in Chem 305. 3 lectures, 1 laboratory. Prerequisite: Chem 328, Phys 123

Chem 352 Biophysical Chemistry (3)

Application of physical chemistry to living systems. Biochemical buffers, electrochemistry, reaction kinetics, surface and transport properties and membranes. Not open to students with credit in Chem 306. 3 lectures. Prerequisite: Chem 351 or 305

Chem 355 Physical Chemistry Laboratory (1)

Experimental studies of gases, solutions, thermochemistry and chemical equilibria. 1 laboratory. Corequisite: Chem 305

Chem 356 Physical Chemistry Laboratory (1)

Experimental studies of phase rule, electrochemistry and chemical kinetics. 1 laboratory. Corequisite: Chem 306

Chem 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of the department head.

Chem 402 Inorganic Chemistry (3)

A systematic study of important elements based on periodic grouping and atomic structure with emphasis on chemical bonding, coordination compounds, and acid-base relationships. 3 lectures. Prerequisite: Chem 306 or permission of instructor.

Chem 403 Advanced Organic Chemistry (3)

A detailed study of the mechanisms of organic reactions and related topics. 3 lectures. Prerequisite: Chem 327, 305 or permission of instructor.

Chem 415 Advanced Physical Chemistry I (3)

Chemical structure. Fundamentals of quantum chemistry, spectroscopy, and the electronic structure of atoms and molecules. Contemporary bonding theories. 3 lectures. Prerequisite: Chem 437

Chem 416 Advanced Physical Chemistry II (3)

Molecular spectra, magnetic resonance spectra, statistical thermodynamics and applications, chemical kinetics and rate theory, advanced electrochemistry. 3 lectures. Prerequisite: Chem 415

Chem 428 Biomacromolecules (4)

Cell growth, differentiation, and control. Biochemical genetics, genetic code, protein synthesis and conformation. Physical methods for enzyme systems. 3 lectures, 1 laboratory. Prerequisite: Chem 329

Chem 434 Advanced Biochemistry (4)

Intermediary metabolism, hereditary molecular diseases, enzyme kinetics, bioenergetics, photosynthesis. Agricultural and industrial applications. 3 lectures, 1 laboratory. Prerequisite: Chem 329

Chem 435 Food Analysis (4)

Techniques used commercially in the chemical analysis of seed and cereal crops, fruit and vegetable crops, forage crops, meat and meat products, milk and dairy products, eggs and poultry products. Vitamin determinations, microbiological assay, quality control, taste testing, legal specifications, grading and labeling. 3 lectures, 1 laboratory. Prerequisite: Chem 328

Chemistry

Chem 436 Agricultural Chemicals (4)

Chemistry of fungicides, insecticides, rodenticides, plant growth regulators, soil conditioners, and fertilizers. Special reference to the analysis, manufacture, toxicology, legal specification, and regulations. 3 lectures, 1 laboratory. Prerequisite: Chem 328

Chem 437 Physical Chemistry (4)

Physical chemistry of the liquid and solid states. Chemical bonding and molecular structure; spectroscopy, diffraction, electrical and magnetic properties of molecules. Surface chemistry and catalysis. 3 lectures, 1 laboratory. Prerequisite: Chem 306 and 356 or consent of instructor.

Chem 439 Instrumental Analysis (4)

Optical, electroanalytical and other techniques of modern instrumental analysis. Current industrial applications. Laboratory work in instrumental methods is emphasized. 2 lectures, 2 laboratories. Prerequisite: Chem 331, 306, and 356

Chem 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

Chem 463 Undergraduate Seminar (2)

Oral presentations of current developments in chemistry based on periodical literature. 2 meetings.

Chem 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Chem 305, 327 or consent of instructor.

Chem 501 Physical Chemistry—Kinetics (3)

Reaction rates and mechanisms of elementary processes; homogeneous and heterogeneous reactions and catalysis. 3 lectures. Prerequisite: one year organic chemistry and one year physical chemistry or consent of instructor.

Chem 504 Advanced Organic Chemistry—Syntheses (3)

Modern and practical methods of constructing molecules. 3 lectures. Prerequisite: Chem 338

Chem 505 Advanced Organic Chemistry—Mechanisms (3)

Scope and mechanism of reactions. Modern structural theory, carbonium ions, carbanions, free radicals, and photochemistry. 3 lectures. Prerequisite: Chem 403

Chem 506 Advanced Organic Chemistry—Natural Products (3)

Structure determination and total synthesis of compounds of biological origin. 3 lectures. Prerequisite: Chem 338

Chem 507 Advanced Biochemistry (3)

Physico-chemical properties of proteins, nucleic acids and enzymes. 3 lectures. Prerequisite: Chem 306, 328 or consent of instructor.

Chem 508 Advanced Biochemistry (3)

Food and nutritional aspects of biochemistry. Vitamins, amino acids, essential fatty acids, minerals, energy metabolism. Deficiency and degenerative diseases. Synthetic and imitation foods. 3 lectures. Prerequisite: Chem 434

Chem 509 Advanced Biochemistry (3)

Molecular biochemistry of cellular ultrastructure, function and division. Function and transformation of biomolecules in plants and animals. 3 lectures. Prerequisite: Chem 507

Chem 513 Advanced Inorganic Chemistry (3)

Selected topics concerning the structures and related properties of inorganic compounds. 3 lectures. Prerequisite: Graduate standing.

Chem 521 Curriculum and Methods in Chemistry (3)

Techniques, aims, and methods of teaching chemistry in secondary schools. Selection, organization, demonstration, and evaluation of teaching material. Demonstrations, laboratories, and projects will be used. 3 lectures. Prerequisite: Graduate standing

Chem 541 Synthetic Methods (2-4)

Techniques for synthesis of organic and inorganic substances. Macroscopic and microscopic procedures of industrial significance. Use of modern equipment and methods; anaerobic, low and high temperature, low and high pressure, and conventional procedures. 2 to 4 laboratories. Prerequisite: Chem 338

Chem 590 Graduate Seminar (1)

Presentation of advanced topics in chemistry, including original work by faculty, guests, and graduate students. Topics will vary each quarter. Total credit limited to 3 units. Required of all graduate students in chemistry. 1 meeting. Prerequisite: graduate standing in chemistry, or consent of instructor.

Chem 599 Thesis (3) (3)

Individual research under the general supervision of the staff leading to a graduate thesis of suitable quality. Prerequisite: Graduate standing in chemistry.

CHILD DEVELOPMENT

CD 103 Dating, Courtship, and Marriage (3)

Relationships and adjustments in family living with emphasis on the beginning stage of the family life cycle. For both men and women. 3 lectures.

CD 108 Child, Family, and Community (3)

Influence of family, society, and cultural forces on behavior of children. Role of parents, teachers, and professional workers on the healthy personality development of the child. Field trips and home visits required. 3 lectures.

CD 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

CD 203 Family Development (3)

Survey of family living at each stage of the life cycle. Emphasis on developmental tasks, socio-economic and cultural influences, and family differences. 3 lectures. Prerequisite: CD 103

CD 232 Child Development—Infancy (3)

Basic principles of development. Growth and development from conception through infancy. Characteristic behavior patterns of the infant in relation to environment. 3 lectures. Prerequisite: Psy 202, CD 103.

CD 233 Child Development—Preschool Years (3)

Development and behavior of the preschool child on the basis of current knowledge in child development. Intellectual, physical, emotional, social, and moral development of the preschool child. Controlled observations in the laboratory nursery school. 3 lectures. Prerequisite: CD 232

CD 301 Afro-American Pre-School Child (3)

Cultural and environmental factors that influence the growth and development of the pre-school Afro-American child. Field trips are required. 3 lectures. Prerequisite: Sophomore standing.

CD 302 Mexican-American Pre-School Child (3)

Cultural and environmental factors that influence the growth and development of the pre-school Mexican-American child. Field trips are required. 3 lectures. Prerequisite: Sophomore standing.

Child Development

CD 303 Family Interaction (3)

Dynamic aspects of dating, courtship, marital and family interaction. Examination of day-to-day experiences faced in family living. 3 lectures. Prerequisite: CD 103, 203

CD 319 Programs for Young Children (3)

Theories of play, creativity, and concept development as they relate to programs for young children. 3 lectures. Concurrent with CD 320. Prerequisite: CD 232, 233

CD 320 Laboratory Study of Young Children (3)

Understanding the principles of behavior and development as implemented in a child development laboratory. TB test required. 1 lecture, 2 laboratories. Prerequisite: CD 232. Concurrent with CD 319

CD 322 Adult, Family, and Community (3)

Principles in adult, family, and community inter/intra-action related to psychology, sociology, and philosophy. 3 lectures.

CD 403 Directed Nursery School and Community Experience (6)

Directed work in a nursery school or community facility. Consultation with college supervisors. Prerequisite: CD 320 and consent of instructor.

CD 404 Administration of Child Development Centers (3)

Preparation for administering child development centers. Housing and equipment, costs, staff, programs, health protection, and community relations. 3 lectures. Prerequisite: CD 319, 320 and consent of instructor.

CD 413 Parent-Child Relationship (3)

Nature, influence and causes of parent behavior; home-school interaction, programs and evaluation. 3 lectures. Prerequisite: CD 319, 320 and consent of instructor.

CD 420 The Family—Middle Years (3)

Analysis of the middle stages of the family life cycle with children from school age until their departure from the home. 3 lectures. Prerequisite: CD 203

CD 421 Aging Families (3)

The family after the children leave the home. Readjustment problems of husband and wife. Adjustments to the death of partners and self and to the decline of abilities. Impact of welfare and other social factors. 3 lectures. Prerequisite: CD 203

CD 450 Introduction to Family Counseling (3)

Basic elements of marriage and family counseling. Clients, counselor, and counseling relationships. Theories and techniques used in family counseling. Role playing. 3 lectures. Prerequisite: CD 303, 420, 421

CD 453 Supervised Field Work (3)

Supervised observation and work in community organizations, public agencies, and child welfare-related projects. Prerequisite: Senior standing and consent of instructor.

CD 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision, the project to be related to a probable field of employment. Results of the study are presented in a formal report. Minimum of 120 hours total time.

CD 463 Undergraduate Seminar (2)

Study and discussion of current developments in the field of child development. 2 lectures. Prerequisite: Senior standing.

CD 464 Current Issues in Family Life Education (2)

Evaluation of contemporary social concerns as they relate to family life. Population, self fulfillment, equal rights. Role of the family life or child development specialist. 2 lectures. Prerequisite: Senior standing.

CD 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

CD 533 The Child in Contemporary Culture (4)

Development of children in the home and family in relation to contemporary society. Emphasis upon research findings. Responsibility in the Child Care Laboratory and selected field experiences. 2 lectures, 2 laboratories. Prerequisite: Graduate standing or consent of instructor.

CITY AND REGIONAL PLANNING

CRP 211, 212 Introduction to Urban Environment (3) (3)

History and analysis of social and technological factors which have influenced the physical growth of cities. Philosophical approaches. Problems of growth and the development of various theories of city planning. Recommended for all majors. 3 lectures. Prerequisite: Eng 105

CRP 215 Data Analysis (3)

Sources of information and data related to City and Regional Planning, Architecture, and Environmental Design. Search, selection, reduction of data, and application to program development. 3 lectures.

CRP 243 Introduction to Urban Environment (2)

Design applications of CRP 211, 212. 2 lectures. Prerequisite: CRP 212

CRP 301, 302 Planning Theory (2) (2)

Planning theory and related topics. Environmental engineering and public health. 2 lectures. Prerequisite: CRP 215, EDes 203

CRP 304 Zoning (2)

Zoning theory and legal background. Historical and current land districting practices. Zoning as a device to guide urban growth; the zoning ordinance, the districting plan; relationship to the general plan. Economic and social ramifications. New concepts. 2 lectures.

CRP 305 Urban Facilities Planning (3)

The urban planner's relationship to community facilities and services. Broad aspects of public health, sanitation municipal engineering. Overview of public systems such as education, transportation, protection and utilities. 3 lectures. Prerequisite: CRP 212 or consent of instructor.

CRP 351, 352, 353 Planning Laboratory (4) (4) (4)

Case study application of planning theory to the community, its components, and to the city and the region. Relationships of city spaces and structures. Redevelopment. Field trips. Individual, team, and interdisciplinary approaches. Computer applications. 4 laboratories. Prerequisite: CRP 215, EDes 203

CRP 400 Special Problems for Advanced Undergraduates (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

CRP 401, 402, 403 Planning Theory (2) (2) (2)

Advanced planning theory and related topics. Law and human ecology. 2 lectures. Prerequisite: CRP 302

CRP 404 Barrio and Ghetto Environment (2)

The physical environment of the barrio and ghetto. Case studies of historical development. Interface between physical environment and social behavior. Community improvement programs including self-help rehabilitation and redevelopment. Field trips. 2 lectures. Prerequisite: Fourth year standing or permission of the instructor.

Computer Science

CRP 411 Implementation Techniques (2)

Procedures in enlisting and sustaining community interest in city and regional plan implementation. Field trips. 2 lectures. Prerequisite: Arch 349

CRP 417 Urban Systems Design (2)

Application of system design concepts to the design of planning models. Study of symbolic models to test and evaluate the organization of urban structures. 2 lectures. Prerequisite: CRP 212 or consent of instructor.

CRP 418 New Town Planning (2)

History, present situation and future of new town planning in the United States. Relationship to other countries. 2 lectures. Prerequisite: CRP 212

CRP 419 International Planning and Development (2)

Problems of urbanization in different parts of the world. Physical planning methodology. Evaluation of general economic development and comparative planning methods found in selected cities. 2 lectures. Prerequisite: CRP 212 or permission of instructor.

CRP 451, 452, 453 Planning Laboratory (4) (4) (4)

Continuation of CRP 351, 352, 353. 4 laboratories. Prerequisite: CRP 302, 353, Arch 349

CRP 457 Planning Information Systems (2)

Use of a problem-oriented system to retrieve statistical information pertinent in planning. 2 activities. Prerequisite: Stat 212, EDes 250, 4th year standing.

CRP 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time. Prerequisite: Senior standing.

CRP 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

COMPUTER SCIENCE

CSc 100 Data Processing (2)

Introduction to computer concepts and the COBOL language. Preparation of business reports with computers. Elements of computer organization and fundamentals of program writing for business oriented problems. 2 lectures.

CSc 101 Fortran Programming (2)

Emphasis on programming techniques for mathematical analysis. Business and science applications. 1 lecture, 1 activity.

CSc 110 Computers and Computing (3)

Applications of computers in modern society. Survey of the development of the art of computing and of computing devices from ancient times to the modern digital computer. Relationship of mathematics to computing procedures. How computers are programmed. 3 lectures.

CSc 140 Business Data Processing (2)

Essentials of COBOL programming. Problem analysis, flow charting, documentation, and coding for computer execution of typical business problems. Credit not allowed for both CSc 140 and CSc 340. 2 lectures. Prerequisite: CSc 100

CSc 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

CSc 218 Boolean Algebra and Applications (3)

Boolean Algebra; minimization of Boolean functions; realization of combinational switching circuits; codes; applications to switching, control, and computation circuits. 3 lectures.

CSc 219 Linear Programming (3)

Introduction to linear programming, the simplex algorithm, duality, sensitivity and post optimal analysis. Use of linear programming techniques to solve linear optimization models. 3 lectures. Prerequisite: 6 units of college mathematics.

CSc 221 Computer Principles and Programming (3)

Organization of general purpose and special purpose digital computers, preparation of programs for general purpose computers, sub-routines. 3 lectures. Prerequisite: CSc 101 or equivalent.

CSc 222 Digital Computer Symbolic Programming (3)

Extension and amplification of language studied in CSc 221. Use of auxiliary storage, writing of subroutines, advanced programming techniques. 3 lectures. Prerequisite: CSc 221

CSc 301 Advanced Fortran Programming (2)

Programming in extended Fortran language with emphasis on program efficiency and advanced features. Comparison of Fortran implementations. 2 lectures. Prerequisite: CSc 101

CSc 304 Digital Computer Programming (3)

Comparative organization and techniques of programming for large modern digital computers. Assembly program usage. 3 lectures. Prerequisite: CSc 221 or consent of instructor.

CSc 306 Programming of Small Computers (3)

Organization and procedures for small digital computers in contrast to larger systems. Applications of computers in on-line control and in graphic communications. Programming of a typical small computer. 3 lectures. Prerequisite: CSc 221

CSc 310 Programming Language/One (PL/I) (3)

Introductory and intermediate treatment of PL/I. PL/I program formats, data forms, data transmission, internal manipulations, sequence control, and program organization. 3 lectures. Prerequisite: CSc 101 or equivalent.

CSc 331 Numerical Linear Analysis (3)

Introduction to methods currently available to engineers, scientists and mathematicians for dealing with systems of linear equations utilizing a digital computer. Solutions of systems of linear equations, calculation of matrix inverses, eigenvalues, and eigenvectors. Applications to problems in engineering and science. 3 lectures. Prerequisite: Math 133 or 143 and ability to program in Fortran.

CSc 332 Introduction to Numerical Methods (3)

Numerical solution of algebraic and transcendental equations and systems of equations, finite differences, interpolation, numerical integration, and numerical solution of ordinary differential equations. 3 lectures. Prerequisite: Math 242 or consent of instructor.

CSc 333 Numerical Analysis (3)

Continuation and expansion of CSc 332. Methods for solving nonlinear systems of equations, the solution of ordinary and partial differential equations; emphasis on methods suitable for the application of digital computers. 2 lectures, 1 activity period. Prerequisite: CSc 332 and ability to program in Fortran.

CSc 340 Cobol Programming (3)

Structure of the Common Business-Oriented Language (COBOL). Coding fundamentals and program logic. Writing of complete Cobol programs applied to typical business data processing problems. Credit not allowed for both CSc 140 and CSc 340. 3 lectures. Prerequisite: Any computer programming course.

Computer Science

CSc 345 Data Structures (3)

Basic concepts of data, storage systems and their properties, data transmission, sequential and linked lists, tree structures, multilinked structures, accessing and traversal, applications to compiler design, list and string processing, sorting, and programming languages. 3 lectures. Prerequisite: CSc 222 or 301 or 310 or 340

CSc 346 Interpretive Computer Simulation (3)

Organization and programming techniques for simulating digital computers on the IBM System/360. 3 lectures. Prerequisite: CSc 345

CSc 350 Systems Analysis (3)

Analysis of administrative and management problems to develop systems utilizing automatic data processing equipment. New and improved procedures, methods and organizational structure to obtain desired objectives. 3 lectures. Prerequisite: Knowledge of Fortran programming, and Stat 211 or 321

CSc 351 Algorithmic Compilers (3)

Formal languages, their decomposition and compiling. Binding and localizing variables using block structures in the analysis of compilers. Dynamic allocation of storage between sections of a process. 3 lectures. Prerequisite: CSc 222, 345

CSc 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with not more than 2 units in any one quarter. Prerequisite: Permission of the department head.

CSc 401, 402, 403 Foundation in Computer Science (5) (5) (5)

Intensive courses to provide the foundation in computer science needed for entrance into the Master's degree program for students whose undergraduate training is not computer science. Fundamentals of computer organization, computer systems, languages, data structures, compilers and assemblers, job control and operating systems. 5 lectures. Prerequisite: Graduate standing and approval of the head of the department.

CSc 410 Computer Fundamentals for Educators (3)

For students who plan to utilize computers at the school or district level. Computer fundamentals. Developing skill in a basic computer language. Programming techniques with applications to educational problem-solving strategies. Not open to students who have taken a previous COBOL course. 3 lectures. Prerequisite: junior standing.

CSc 411 Computer Applications in School Administration (3)

Applications of computer techniques to data processing and other management applications in the administration of schools and school districts. 3 lectures. Prerequisite: CSc 410 or knowledge of COBOL programming.

CSc 414 Computer Assisted Instruction (3)

Techniques of utilizing the computer to assist individualized instruction. Comparison with other methods of programmed instruction. Hardware and software requirements of computerized classrooms for elementary, secondary, and college applications. 3 lectures. Prerequisite: Senior standing.

CSc 419 Mathematical Programming (3)

Extensions of linear programming, introduction to non-linear programming, dynamic programming and dynamic optimization procedures with industrial applications. 3 lectures. Prerequisite: CSc 219, 350; Math 143

CSc 440 Computer System Development (3)

Systems analysis and design considerations for development and installation of automated data processing information systems. Evaluation of performance. Organizational structures. Training. New and improved procedures for management direction and control. 3 lectures. Prerequisite: CSc 222 or 304 or 306

CSc 445 File Management (3)

Principles of data based systems design. File creation, organization, and maintenance. Efficient searching procedures. Directory maintenance. Hierarchical storages. Analysis of large file problems. Files containing well-structured data such as business, socioeconomic, and scientific data files. 3 lectures. Prerequisite: CSc 345

CSc 451 Programming Languages (3)

Comparative structure and characteristics of programming languages. Compile-time and run-time features. Recursion. List and string processing techniques. Trends in new and experimental languages. 3 lectures. Prerequisite: CSc 351



CSc 452 Computer Programming Systems (3)

Design of assembly systems, macro instructions, program intercommunication and linkage. Structure and use of program libraries. Input and output programming systems, debugging systems and source language debugging. Assembly systems and software. Batch processing and executive systems. 3 lectures. Prerequisite: CSc 222, 345

CSc 453 Multi-programming and Multi-processor Systems (3)

Interrupt, sequential, and multi-programming systems. Priorities and scheduling. Time sharing systems. Use of bulk memory. Simple two-processor systems and programming. System and language requirements. 3 lectures. Prerequisite: CSc 452 or equivalent.

CSc 455 Computer Graphics (3)

Graphics techniques for computer input, output, manipulation and control. Printer, plotter and cathode ray tube (CRT) displays. Macro instructions for data handling and problem oriented routines. Use of graphics sub-routines for FORTRAN, COBOL and PL/1. Use of CRT displays for operating system job control. 3 lectures. Prerequisite: CSc 221, 301 or 310 or 340

CSc 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

Computer Science

CSc 463 Undergraduate Seminar (2)

Reports and discussions by students through seminar methods, based on their senior projects and on other topics relating to computer usage and programming which are of interest to persons preparing for a career in computer science. 2 activity periods.

CSc 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor

*CSc 519 Computer Modeling and Simulation I (4)

Extensions of linear and nonlinear programming. Computational aspects of mathematical programming, duality, sensitivity and decomposition for large scale optimization problems. Simulation as a tool for optimization. 4 lectures. Prerequisite: CSc 419

*CSc 520 Computer Modeling and Simulation II (4)

Simulation methodology, simulation languages and selected applications of simulation in computer operation and management science. 4 lectures. Prerequisite: CSc 350

CSc 531 Numerical Solution of Algebraic Systems (3)

Direct and iterative methods for computing solutions, eigenvalues, and eigenvectors of systems of equations. Solutions of linear and nonlinear problems of potential theory. 3 lectures. Prerequisite: CSc 333, Math 313, 319

CSc 532 Numerical Solution of Differential Equations (3)

Single step and predictor corrector methods for initial value problems. Two-point boundary value problems. Extrapolation methods. 3 lectures. Prerequisite: CSc 333, Math 313, 319

CSc 533 Numerical Solution of Differential Equations (3)

Explicit and implicit methods for the solution of boundary value problems for parabolic and hyperbolic equations. Emphasis on applications to the physical sciences. 3 lectures. Prerequisite: CSc 531

CSc 541 Information Processing (4)

Theory and fundamentals. Algorithm design and evaluation, advanced data structures, language structure, string manipulation, network and graph theoretic methods of analysis, file organization and management. 4 lectures. Prerequisite: CSc 351, 452 and 310, or CSc 503

CSc 542 Information Processing (4)

Fundamentals and applications. Principles of system design, modularity and interfacing, effects of interactive systems, evaluation of information systems. Selected applications from large business or scientific data processing systems, real-time data acquisition systems, information retrieval, management information systems, and educational data systems. 4 lectures. Prerequisite: CSc 541

CSc 551 Computer Systems and Software (4)

Comparison of language features and compiler techniques for higher level languages. Predicate calculus. List and string processing languages. Compiler-compiler concept and implementation. Simulation languages. 4 lectures. Prerequisite: CSc 451 or 503

CSc 552 Computer Systems and Software (4)

General concepts of computer architecture and operating systems. Design features of advanced computers, general time-sharing systems and schemes for dynamic memory allocation, scheduling and protection. Dynamic linkage between subroutines. Intercommunication between input/output and processors. 4 lectures. Prerequisite: CSc 453

* Not offered 1973-74.

CSc 560 Practicum in Computer Science (5)

Documentation and solution of practical problems in computer science selected from business, industrial, and scientific organizations under guidance of lecturers from cooperating organizations and members of the computer science faculty. 1 lecture, 4 activities. Prerequisite: CSc 520 or 533 or 542 or 552

CSc 590 Seminar in Computer Science (3)

Current problems and research in the field of computer science through discussions and selected readings. Group study of selected advanced topics. 3 meetings. Prerequisite: Graduate standing.

CSc 599 Thesis (4-6)

Individual research under faculty supervision leading to an acceptable thesis. Prerequisite: Graduate standing and consent of instructor.

CONSERVATION

Cons 311 Introductory Conservation (3)

Basic principles and problems of conservation. Organization, control and interrelationships of government and private agencies dealing with the conservation of natural resources. 3 lectures. Prerequisite: Junior standing.

Cons 422 Freshwater Fisheries (3)

Freshwater fishes and fishery resources of the Pacific Coast. Identification, life history, ecology and economics of important western and local species. Field trips to various warm and cold water fishery facilities. 2 lectures, 1 laboratory. Prerequisite: Zoo 132, Zoo 324 recommended.

Cons 431 Game Management (4)

General principles, problems and techniques of increasing the harvest of waterfowl, upland game and big game. The identification and life histories of important western game species. 3 lectures, 1 laboratory. Prerequisite: Bio 325 or ASci 229

Cons 433 Aquaculture (4)

Biological, physical, chemical, and economic aspects of reproduction, development, growth, nutrition, and disease of fishes in culture. Modern methods and problems in the culture of warm water species, especially those suited to farm situations. 2 lectures, 2 laboratories. Prerequisite: Zoo 132 and Bio 334. Zoo 324 recommended.



CONSTRUCTION ENGINEERING

ConE 240 Additional Engineering Laboratory (1-2)

Total credit limited to 4 units with not more than 2 units in any one quarter. 1 or 2 laboratories.

ConE 317 History of Construction (3)

Development of construction techniques and building science. Effects of scientific and engineering advancements on construction theory. The construction engineer as a member of the building team and as consultant to the architect, planner and structural engineer. 3 lectures. Prerequisite: Junior standing.

ConE 319 Human Performance in Construction (3)

Assessment and measurement of the relationships between design, methods of construction, cost and manpower utilization. Design and construction of structures for minimum cost consistent with intended function. Materials selection and construction processes related to minimum man-hours and nonspecialized labor skills. 3 lectures. Prerequisite: 3rd year standing in the School of Arch & Env Design.

ConE 321 Concrete Technology (3)

Study of modern concepts which form the basis for solutions to problems of concrete construction. Includes significant developments in concrete chemistry and strength theory from 1963 to present. Development of a rational basis for writing concrete specifications and for proportioning concrete mixes. 2 lectures, 1 laboratory. Prerequisite: ArcE 206, 344

ConE 341, 342, 343 Construction Practice (2) (2) (2)

Masonry and concrete structures. Emphasis on recently-developed building systems, equipment, materials and techniques. Related construction drawings and details, design of formwork. One designated field trip required. 2 laboratories. Prerequisite: Arch 232, EDes 203, ArcE 206

ConE 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ConE 412 Construction Regulations (2)

Laws and legal problems related to the construction industry. Contractor's licensing law, labor laws, lien laws, and safety requirements. 2 lectures. Prerequisite: 4th year standing.

ConE 420 Construction Cost Estimating (2)

Survey of methods and practices of construction cost estimating. Solutions to problems in estimating. For students not majoring in Construction Engineering. 1 lecture, 1 laboratory. Prerequisite: 4th year standing.

ConE 421 Earth Construction (2)

Design fundamentals, specifications, construction methods, inspection and laboratory control in the general area of embankment and fill construction. Evaluation of specifications from the viewpoints of both the owner and the contractor. 1 lecture, 1 laboratory. Prerequisite: ArcE 421

ConE 433 Construction Planning and Control (2)

Introduction to Critical Path Method, PERT, and other systems of construction planning and control. Graphic representation and computer applications. For students not majoring in Construction Engineering. 1 lecture, 1 laboratory. Prerequisite: EDes 250, 4th year standing.

ConE 441, 442, 443 Construction Practice (2) (2) (2)

Continuation of ConE 343. Problems in quantity surveying, estimating. 2 activities. Prerequisite: ConE 343

ConE 451, 452, 453 Construction Engineering Laboratory (5) (5) (5)

Comprehensive projects stressing decision making and design solutions to the problems in construction engineering; team projects encouraged. Emphasis on critical path planning and cost control, job organization, scheduling and financing, field projects supervision, bidding procedures and construction law applications. 5 laboratories. Prerequisite: ConE 343, ArcE 305, Stat 321

ConE 461, 462 Senior Project (2) (2)

Selection and completion of a comprehensive project under faculty supervision. Problems to involve the student's technical and creative skills. Construction and team projects encouraged. 120 hours minimum total time. Prerequisite: ConE 343

ConE 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

CROP SCIENCE

CrSc 100 Principles of Insect Pest Management (4)

Identification and control of common insect pests of agricultural crops and stored products. Safe use and handling procedures of insecticides and related materials. Natural, cultural, mechanical, and chemical controls of injurious insects and mites. 3 lectures, 1 laboratory. Not open to degree students for degree credit.

CrSc 123 Forage Crops (4)

Production, harvest, and utilization of principal California forage crops. Identification and utilization of forage plants studied in the field. Field trips to local areas. 3 lectures, 1 laboratory.

CrSc 131 Introduction to Crop Science (4)

Production principles for field and vegetable crops. Fundamental botany, taxonomy and cultural practices. Soil tillage, fertilization, seed selection, planting and harvesting methods, irrigation, weed control, pest control, and crop rotation. Production practices for cotton and sugar beets. 3 lectures, 1 laboratory. Credit will not be allowed for both CrSc 131 and CrSc 230

CrSc 132 Grain Crops (4)

Production, adaptation, distribution, and utilization of major crops harvested by combine including cereals, large seeded legumes, milo, flax, corn, and safflower. Field trips to major California cereal production areas. 3 lectures, 1 laboratory. Prerequisite: CrSc 131 or VgSc 230

CrSc 133 Row Crops (4)

Adaptation, production, and utilization of major row crops such as potatoes, sweet corn, tomatoes, artichokes, garlic, onions, asparagus, and peas. 3 lectures, 1 laboratory. Prerequisite: CrSc 131 or VgSc 230

CrSc 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

CrSc 221 Weed Control (4)

Identification, life histories, and control of common, noxious, and poisonous California weeds. Weed control chemicals and equipment for cultivated crops, irrigation systems, range, wastelands. 3 lectures, 1 laboratory. Prerequisite: Sophomore standing

CrSc 223 Vertebrate Pest Management and Control (3)

Vertebrate pests injurious to agriculture crops, livestock, and stored products, with emphasis on ground squirrels, rats, mice, birds, gophers, and other animals. Life habits, identification, control methods, and materials. Related laws and regulations. 2 lectures, 1 laboratory.

Crop Science

CrSc 230 General Field Crops (4)

Production, harvest, and use of important cereal and field crops in California. Production areas, crop rotations, disease and pest control. 3 lectures, 1 laboratory. Credit will not be allowed for both CrSc 131 and 230

CrSc 231 Commercial Seed Production and Processing (4)

Production and processing of certified and commercial seed including seed analysis, germination, quality control, cleaning and storage techniques, and seed laws. 3 lectures, 1 laboratory. Prerequisite: CrSc 132 or 133

CrSc 303 Agricultural Code of California (3)

Services and procedures of the California Agricultural Code. Provisions of the Agricultural Code and other laws affecting agricultural industries, particularly plant industries. Grain warehouse inspection, seed inspection, county agricultural departments, plant quarantine and standardization. 3 lectures.

CrSc 304 Plant Breeding (4)

Application of principles of plant improvement through selection, hybridization, and utilization of hybrid vigor. 3 lectures, 1 laboratory. Prerequisite: Bio 303

CrSc 305 Agricultural Inspection and Services (3)

Purpose and functions of county departments of agriculture and the related functions within the State Department of Agriculture. Basic background material to qualify students for the eight specific County Inspectors Examinations. 3 lectures. Prerequisite: CrSc 303

CrSc 311 Applied Insect Pest Management (4)

Principles of controlling insect pests including biological, cultural, physical, mechanical, and chemical controls. Identification of insects injurious to California field, fruit, and vegetable crops including stored products and livestock. Insecticide formulation and methods of application. 3 lectures, 1 laboratory.

CrSc 321 Advanced Insect Pest Management (4)

Insecticide classification, insect toxicology, and resistance. Fate of pesticides in the environment. Alternate methods of insect control. Techniques of insect bioassay, insect and vertebrate toxicology, biological controls, insecticide residues. 3 lectures, 1 laboratory. Prerequisite: CrSc 311, Chem 328

CrSc 322 Crop Technology (4)

Grades and laboratory tests for quality of California field crops. The effects of harvesting, storage, and quality control on market value and processing. 3 lectures, 1 laboratory. Prerequisite: CrSc 132, 133

CrSc 323 Tropical Crop Production (4)

Production distribution, adaptation and utilization of major field and vegetable crops of economic importance in tropical and subtropical areas. 3 lectures, 1 laboratory.

CrSc 325 Hay and Processed Forage Crops (3)

Intensive study of hay, dehydration and silage making procedures. Storage facilities, grades and market values, anti-oxidants and feed additives that affect bloat and feed quality. 2 lectures, 1 laboratory. Prerequisite: Chem 121

CrSc 326 Plant Protection Techniques (3)

Plant protection methods and techniques. Pesticide formulation and evaluation of application results for uniformity, rate, and effective placement. Air and ground applications, calibrations. Federal, state, and local laws governing pesticide use and application equipment. 2 lectures, 1 laboratory. Prerequisite: CrSc 221, 311

CrSc 330 Pasture Management (4)

Identification, production, utilization of irrigated and non-irrigated pasture crops. A study of grazing systems and the merits of mixtures and non-mixtures. A field trip to a production area may be required. 3 lectures, 1 laboratory. Prerequisite: CrSc 131 or CrSc 230

CrSc 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head

CrSc 410 Crop Physiology (4)

Practical studies in plant nutrition, soil-water-plant relationships, seed physiology, growth regulators, pesticide reactions, and controlled environments. 3 lectures, 1 laboratory. Prerequisite: Bot 122, SS 221, CrSc 131 or 230, and Chem 328

CrSc 411 Experimental Techniques and Analysis (4)

Principal methods of experimental design and analysis of collected data. Field practice in planning and lay-out with emphasis on management of agronomic and soils experiments. 3 lectures, 1 laboratory. Prerequisite: Junior or senior standing and Math 103 or equivalent.

CrSc 421 Oil and Fiber Crops (4)

Culture, harvest, grading, and marketing of cotton, flax, safflower, castor beans, minor oil and fiber crops. Field trips to major centers of production and marketing are required. 3 lectures, 1 laboratory. Prerequisite: CrSc 131 or 230

CrSc 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

CrSc 463 Undergraduate Seminar (2)

Oral presentation and leadership of group study on recent developments in the major field. 2 lectures.

CrSc 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

CrSc 521 Advanced Field Crop Production (4)

Production and management of field crops under both intensive and extensive cultural practices; interaction between the various growth factors at various levels of production and interaction of cultural practices and plant requirements. 3 lectures, 1 laboratory. Prerequisite: Permission of the instructor.

CrSc 581 Graduate Seminar in Crop Production (3)

Group study and oral reports on current technical problems and research results pertaining to field and vegetable crops production or marketing. 3 lectures.

DAIRY HUSBANDRY

DH 101 Dairy Feeds and Feeding (2)

Identification and classification of feeds; simple use of food nutrients, protein, fat, and carbohydrates; methods of preparing feeds; relative values of common feeds for each class of livestock with special attention to dairy cattle, the use of byproduct feeds. 2 lectures.

DH 102 Feeding Dairy Cattle (2)

Balancing dairy cattle rations. Feeding practices and nutritional requirements. 2 lectures. Prerequisite: DH 101

DH 121 Elements of Dairying (4)

General introductory dairy course. General information on statistics and opportunities in the dairy industry. Composition and food value of dairy products. Common tests to determine quality of products. Principles and practices of the feeding and management of dairy cattle. 3 lectures, 1 laboratory.

Dairy Husbandry

DH 133 Fitting and Showing Dairy Cattle (2)

Selection, preparation, presentation of dairy cattle for shows, sales, and photographing. 1 lecture, 1 laboratory.

DH 142 Dairy Cattle Selection (2)

Selection of dairy cattle with consideration to breed characteristics and conformation. Evaluation of type characteristics. Correlation between type and production. 2 laboratories.

DH 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.



DH 221 Milk Production (4)

Factors affecting milk production. Dairy production problems and methods. Practice in many of the frequently used dairy production skills. 3 lectures, 1 laboratory. Prerequisite: DH 102, 121, 142

DH 222 Commercial Dairy Herd Management (4)

Commercial dairy practices from the standpoint of cost of feeding and management. Visits are made to successful dairy farms. 3 lectures, 1 laboratory. Prerequisite: DH 221

DH 230 General Dairy Husbandry (4)

Selection, breeding, feeding, and management of dairy cattle. Composition and food value of dairy products. Dairy industry statistics and opportunities. Producing and handling products. A general course for other than dairy majors. 3 lectures, 1 laboratory.

DH 233 Advanced Dairy Cattle Selection (2)

Advanced practice in the comparative evaluation of dairy cattle. Detailed scoring and classifying cattle on conformation. Functional anatomy and relationship to production. Visits to breeding establishments and shows. 1 lecture, 1 laboratory. Prerequisite: DH 142

DH 301 Advanced Dairy Cattle Feeding (2)

Nutrition requirements of dairy cattle. Successful, economical feeding practices. 2 lectures. Prerequisite: DH 102

DH 323 History of Breeds and Pedigrees (4)

Origin of modern dairy cattle breeds, organization of cattle clubs. Breed families and herds. Practice in compiling pedigrees. 3 lectures, 1 laboratory. Prerequisite: DH 221

DH 326 Purebred Dairy Herd Management (4)

Methods and problems in establishing, breeding, feeding, and management of a purebred dairy herd and farm. Visits are made to leading purebred dairy farms and to purebred cattle sales. 3 lectures, 1 laboratory. Prerequisite: DH 222, 323

DH 330 Artificial Insemination (2)

Techniques in the collection, evaluation, processing, storage and shipment of semen. Insemination procedures. Fertility problems. Record keeping. 1 lecture, 1 laboratory. Prerequisite: DH 121 or AH 121, VS 123 or VS 100

DH 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

DH 422 Breeding and Selection of Dairy Cattle (4)

Evaluation of inherited characteristics in dairy cattle from an economic standpoint. Proving and selecting sires and dams. 3 lectures, 1 laboratory. Prerequisite: Bio 303, DH 142

DH 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

DH 463 Undergraduate Seminar (2)

Reports on student papers, bulletins, periodical articles, and dairy research experiments. Sources of dairy husbandry information. Practice in oral reporting. Late developments and research work in the dairy industry. 2 lectures.

DH 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

DH 519 Advanced Animal Genetics (3)

Application of advanced genetic principles to a program of animal improvement. Mating systems, methods of selection and expected gains. Genetic basis of estimates or heritability, repeatability, genetic correlation, and the development of economical selection indices. 3 lectures. Prerequisite: Bio 303 and permission of instructor.

DH 581 Graduate Seminar in Dairy Production (3)

Current findings and research problems in the field and their application to the industry. 3 lectures.

DAIRY MANUFACTURING

DM 132 Ice Cream Making (4)

Calculating and processing ice cream mixes. Proper equipment and methods required to freeze, package, harden and distribute ice cream and related products. Practice in the college creamery as well as inspection of commercial plants. Manufacture of sherbets and ice milk. Survey of the imitation ice cream field, processing of vegetable fats, etc. 3 lectures, 1 laboratory. Prerequisite: DH 121

DM 133 Market Milk (4)

Buildings, equipment and methods used to handle, process and distribute market milk. Judging and grading market milk. Practice in the college creamery and sales room as well as in commercial plants. 3 lectures, 1 laboratory. Prerequisite: DH 121

DM 202 Dairy Product Merchandising (2)

Product promotion, advertising, merchandising. State and national programs. Independent advertising and sales promotion programs. 2 lectures.

Drama

DM 220 Dairy Product Consumer Education (2)

Consumer education in identification, selection, and nutritional value of dairy products. Comparison of dairy products with substitutes and imitations. Uses of dairy products in diets and home meal planning. Caloric values, chemical compositions, and constituents of dairy products. 1 lecture, 1 activity.

DM 230 General Dairy Manufacturing (4)

Nontechnical presentation of the methods and problems involved in modern creamery operation. Testing, flavoring and manufacturing butter, various cheeses, ice cream, market milk, and related products. Elective course for non-dairy students. Survey course for dairy husbandry majors. 3 lectures, 1 laboratory.

DM 233 Dairy Foods Evaluation (2)

Basic principles of sensory examination of dairy foods. Physiology of the various senses and their relationship to distinguishing the quality of dairy products by sight, flavor, body and texture. Product defects, causes, and methods of prevention. 1 lecture, 1 laboratory. Prerequisite: DM 133

DM 331 Condensed and Dry Milk (4)

Processing, packaging, and marketing of evaporated and condensed milk and dry milk powders. Field trips are made to study commercial plants, methods and equipment. Mojonnier analysis and other routine tests. 3 lectures, 1 laboratory. Prerequisite: DM 132, 133

DM 332 Dairy Inspection (2)

California dairy codes and score cards used for dairy plants and farms. Quality tests of dairy products. Practice in inspecting and scoring dairy farms and factories. Organizational structure of inspection services. Laws governing pricing and marketing. Role of antibiotics and pesticides in modern dairying. 1 lecture, 1 laboratory. Prerequisite: DM 133, Bact 221

DM 334 Cheese Making (4)

Equipment and methods needed to manufacture, package, cure and market various types of cheese. Practice in the college creamery. 3 lectures, 1 laboratory. Prerequisite: Bact 221, DM 133

DM 336 Buttermaking (4)

Equipment and methods needed to handle and process manufacturing cream. Churning, packaging, storing, and marketing butter. Theory of continuous buttermaking. Practice in college creamery. 3 lectures, 1 laboratory. Prerequisite: DH 133, Bact 221

DM 431 Dairy Plant Management (4)

Basic management principles applied to the Dairy Industry. Industrial organization and control. Dairy plant location, design facilities and layout. Elements of successful salesmanship, advertising, and marketing. Survey of overhead allocation and of financing and depreciation applied to the dairy industry. Study of significant operating ratios and comparative analysis of financial statements. 3 lectures, 1 laboratory. Prerequisite: Senior standing.

DRAMA

Dr 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

Dr 220 Introduction to Theater (3)

Theatrical terminology, basic stagecraft and lighting, stage management, theater practice. Historical development of the theater. 2 lectures, 1 two-hour laboratory.

Dr 320 Acting (3)

Basic acting techniques, improvisation, characterization, pantomime and movement. 2 lectures, 1 two-hour laboratory. Prerequisite: Dr 220

Dr 321 Directing (3)

Script analysis, motivation and blocking of action, preparation of the prompt book. Direction of practice scenes. 2 lectures, 1 two-hour laboratory. Prerequisite: Dr 220

Dr 322 Stagecraft (2)

Scenery design, construction, painting, lighting, costumes, and make-up. 2 two-hour laboratories. Maximum of 6 units may be earned. Prerequisite: Dr 220 or consent of instructor.

Dr 327, 328 Theatrical History and Literature (4) (4)

History of the theater and correlated studies of representative plays from 500 B.C. to 1660 A.D., and from 1660 A.D. to present. 4 lectures. Prerequisite: Dr 220 or consent of instructor.

Dr 331 Applied Theater Practices (2)

Preparation of a play for public presentation, including acting, stage management, publicity and house management. Maximum of 6 units credit may be earned. 2 laboratories.

Dr 347 Children's Drama (3)

Role-playing, group dramatization, and related activities. For students preparing to teach. 1 lecture, 2 two-hour laboratories.

Dr 422 Stage Scenery and Lighting Design (3)

Stage scenery and lighting design from the study of the script through the rendering of elevations and the construction and lighting of models. Light and color as used in scenery design. 3 lectures. Prerequisite: Dr 220

Dr 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

ECONOMICS

Ec 105 Consumer Economics (3)

Consumer-producer relationships, money management, buying methods; investments, insurance, and housing; agencies that help the consumer. 3 lectures.

Ec 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

Ec 201 Survey of Economics (3)

Basic material covered in Principles of Economics, Ec 211, 212, 213 in a less detailed and technical manner. For majors requiring one quarter of economics. Not open to students with previous credit in Ec 211 or 212 or equivalent. 3 lectures. Prerequisite: Sophomore standing. Successful completion of Freshman Composition recommended.

Ec 211 Principles of Economics (3)

Macro-economics: analysis of the forces which determine the levels of national income, output, and employment. Measurement of the national product; inflation; money, banking, monetary and fiscal policies. 3 lectures. Prerequisite: Sophomore standing. Successful completion of freshman English recommended.

Ec 212 Principles of Economics (3)

Micro-economics: principles and applications in the theory of producer and consumer behavior with focus on the output market. Effect on the national economy. 3 lectures. Prerequisite: Ec 211 or consent of instructor.

Economics

Ec 213 Principles of Economics (3)

Principles and applications in macro and micro-economics; distribution of income theory, growth and development, international trade, and current domestic economic problems. 3 lectures. Prerequisite: Ec 212

Ec 301 Introduction to Managerial Economics (3)

Fundamental principles and analytical tools of economics useful in business decision making; applications to management through case study of actual business and managerial situations. 3 lectures. Prerequisite: Ec 212 or consent of instructor.

Ec 304 Comparative Economic Systems (3)

Analysis of economic principles and institutions applicable to capitalism, socialism, and communism. 3 lectures. Prerequisite: Ec 201 or 211

Ec 311, 312, 313 Intermediate Economic Analysis (4) (4) (4)

Economics of prices, markets; demand, supply, returns, and costs; employment, income; factor pricing and income distribution; welfare and economic progress. Analytical model building, analysis and policy decision making in business firms, households and government. 4 lectures. Prerequisite: Ec 213 or equivalent; Math 221, Stat 211, 212 or equivalent. Prerequisite for Ec 313 is Ec 337

Ec 317 Development of Economic Analysis (3)

Analysis of ideas related to the development of economic theory in the Western civilization from the Greeks through the classical, neoclassical, and Keynesian to the current post-Keynesian concepts. 3 lectures. Prerequisite: Junior standing and satisfactory completion of Ec 211, 212, 213, or equivalent.

Ec 324 American Economic History (3)

Topical economic analysis of major events and institutions of American economic history as viewed against their causes, origin and development. Economic development of America from an underdeveloped nation. Agriculture, transportation, monetary and banking policies, business, labor, and growth of governmental activities. 3 lectures. Prerequisite: Ec 201 or 211

Ec 325 Underdevelopment and Economic Growth (3)

Economic Development: the less developed world and the American interest. 3 lectures. Prerequisite: Ec 201 or 211

Ec 337 Money, Banking and Credit (3)

Institutions and principles of money flow and money markets as they relate to the business enterprise. 3 lectures. Prerequisite: Ec 201 or 211

Ec 339 Econometrics (4)

Specification and statistical inference in economic models; estimation, verification and prediction of economic variables. 4 lectures. Prerequisite: Ec 313, CSc 101 or consent of instructor.

Ec 340 Quantitative Techniques for Economics (4)

Application of quantitative techniques to selected topics in micro-economic and macro-economic theory; static optimization theory; use of difference and differential equations in dynamic economic models. 4 lectures. Prerequisite: Math 143, Stat 323

Ec 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of the department head.

Ec 401 International Trade (3)

The United States and the world economy; mechanism of exchange; balance of payments. 3 lectures. Prerequisite: Ec 213

Ec 402 Public Finance (3)

Principles of government financing and its various economic and social effects; collecting, spending and administration of public funds, particularly at state and local levels. 3 lectures. Prerequisite: Ec 213

Ec 406 Business Fluctuations and Forecasting (3)

Causes and measurement of business fluctuations. Techniques of forecasting. 3 lectures. Prerequisite: Ec 201 or 211, Stat 212

Ec 410 Cost-Benefit Analysis (3)

Principles of rational decision making with respect to business and government spending. Measurement of costs and benefits, interest rates, and criterion selection. 3 lectures. Prerequisite: Ec 312

Ec 413 Labor Economics (3)

Wage determination theory, basic economic factors that affect the labor movement, economic impact of union activities on employment, output, income, wages, prices, and national economic policy. 3 lectures. Prerequisite: Ec 212 or consent of instructor.

Ec 414 Monetary and Fiscal Policies (4)

National economic fluctuation models and related corrective monetary and fiscal policies on income, employment, output, growth and prices. 4 lectures. Prerequisite: Ec 313, 337

Ec 415 Advanced Analysis of Economic Development (3)

Advanced development theory. Application of theory to specific development problems. Special interest study and discussion. 3 lectures. Prerequisite: Ec 313, 325, or permission of instructor.

Ec 461, 462 Senior Project (2) (2)

Selection and analysis of a problem under faculty supervision. Problems typical of those which graduates must solve in their fields of employment. Formal report is required. Minimum 120 hours total time.

Ec 463 Undergraduate Seminar (2)

Seminar in applications of economic theory with emphasis on current problems. 3 meetings. Prerequisite: Ec 462

Ec 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: consent of instructor.

Ec 582 Seminar in Economic Problems (1-3)

Selected problems at an advanced level; distribution of income, private and public finance, economic mobilization, and international trade. 1 to 3 meetings. Prerequisite: 9 units of economics and graduate standing or consent of the instructor. Maximum of 6 units credit may be earned.

EDUCATION

Ed 203 Efficient Reading (2)

Development of reading efficiency required in modern business, industry, and the professions. 1 lecture, 1 activity. Prerequisite: Eng 104

Ed 304 Human Development (3)

Human development with emphasis on the years up to adolescence. The physical, mental, emotional, and social aspects of development and behavior. Controlled observation in the public schools. Required for California elementary teaching credential. Recommended for secondary teacher candidates. 2 lectures, 1 activity. Prerequisite: Junior standing, Psy 202

Ed 312 Educational Psychology (3)

How students learn in school, motivation and classroom management, nature of the learning process and adolescent development. Observations at appropriate grade levels. Required for California secondary teaching credential. Recommended for elementary teacher candidates. 3 lectures. Prerequisite: Psy 202

Education

Ed 315 Contemporary Education of the Afro-American (3)

Interpretation, analysis, and critique of major problems, issues and trends affecting contemporary education of the Afro-American within social, economic and educational institutions. 3 lectures. Prerequisite: Soc 105, Hist 331, or consent of instructor.

Ed 322 Community Laboratory (2)

Learning experiences in cooperation with youth club activities and educational agencies. Application of knowledge and skills acquired in college classrooms. Supervised activities with children and adults in educational programs. 1 lecture, 1 activity. Total credit limited to 4 units. Prerequisite: Ed 304, 312, or permission of the instructor.

Ed 401 Public Education in American Society (3)

Development of public education in United States and California. Purpose and structure of the school system. Observations in the public schools. Prerequisite for application to teacher education program. Required for California elementary and secondary teaching credentials. 3 lectures.

Ed 402 Minority Student Counseling and Guidance (3)

Socio-psychological concepts of the minority culture. Effects of poverty and the significance of minority status. Counseling and guidance techniques, parent involvement, and community relations. 3 lectures. Prerequisite: Psy 202

Ed 403 Teaching-Learning Strategies (3)

Applied theory of teaching-learning dealing with instructional planning, instructional media, and classroom operation. The teacher as facilitator of learning. Required for California Secondary Teaching Credential. 3 activities. Prerequisite: Ed 312 or consent of instructor.

Ed 414 Teaching Reading to Bilingual Students (3)

Principles, procedures and materials for teaching reading to bilingual students coupled with diagnostic and prescriptive methods for understanding reading problems of the bilingual student. 2 lectures, 1 activity. Prerequisite: Ed 434

Ed 415 Early Childhood Education (3)

Brief history of the kindergarten and nursery school program. Study of the needs, behavior and development of young children and how they affect readiness for learning. 3 lectures.

Ed 416 Contemporary Education of the Chicano (3)

Methods of teaching the Chicano in public schools subjects with emphasis on materials and procedures which will facilitate learning. 3 lectures. Prerequisite: CD 302, Soc 105, Hist 331 or consent of instructor.

Ed 418 Principles of Adult Education (3)

Purposes, significance, scope and methods of teaching as applied to adult education. 3 lectures.

Ed 421 Instructional Media Technology (3)

Visual and auditory methods and materials of value in classroom teaching in elementary and secondary schools. Lecture, lecture-demonstration, discussion, pre-viewing, and laboratory work. Planning and correlating use of audiovisual techniques in the classroom. 2 lectures, 1 laboratory. Prerequisite: Ed 312 or consent of instructor.

Ed 422 Audiovisual Training for Business and Industry (3)

Industrial uses of visual and auditory materials in planning training aids, mass communication materials, demonstrations, mockups, models, and conference leading techniques. Planning, pre-viewing, and skill development for business and industry. 2 lectures, 1 laboratory. Prerequisite: Psy 302 or consent of instructor.

Ed 434 Curriculum and Methods in Elementary School Reading (3)

Teaching reading, reading readiness, psychology of learning to read, instructional materials, evaluating growth, developing independent reading skills, recreational reading. 2 lectures, 1 activity. Prerequisite: Advanced standing.

Ed 439 Supervised School Experience (3-5)

Supervised observation and participation in public schools, including experiences as teacher aide or instruction assistant; seminars relating to instructional procedures including use of instructional media in public school experiences. Prerequisite: Ed 304 or Ed 312, Ed 401 (may be taken concurrently), and consent of instructor.

Ed 440 Student Teaching (3-12)

Student teaching includes participation, teaching, and allied activities under the direction of a selected regular teacher in a public school in consultation with college supervisors. The application for student teaching must be approved prior to registration for Ed 440. A grade below C is unacceptable for recommendation for a credential.

Ed 441 Student Teaching Practicum (3)

Practices and problems of student teaching. Consideration of professional school and community experiences encountered during student teaching. Current innovations in teaching procedures and materials. Taken concurrently with student teaching. 2 lectures, 1 activity.

Ed 442 Curriculum and Methods in Kindergarten-Primary Education (3)

Objectives, methods, and curriculum for the kindergarten-primary grades. Acquisition of appropriate materials, and construction of instructional aids. 2 lectures, 1 activity. Prerequisite: Advanced standing.

Ed 443 Curriculum and Methods in Elementary School Language Arts (3)

Methods and materials for teaching language usage, spelling, handwriting, listening and speaking. 2 lectures, 1 activity. Prerequisite: Advanced standing.

Ed 444 Curriculum and Methods in Elementary School Science (3)

Curriculum, methods, and teaching procedures in elementary school science. The California Science Program. 2 lectures, 1 activity. Prerequisite: Advanced standing and approval of credential advisor.

Ed 445 Curriculum and Methods in Elementary School Social Studies (3)

Curriculum, methods, and teaching procedures in elementary school social studies with emphasis on the California program. 2 lectures, 1 activity. Prerequisite: Advanced standing and approval of credential advisor.

Ed 446 Curriculum and Methods in Conservation Education (3)

Methods of integrating conservation into the curriculum of the public schools. Techniques of teaching, instructional materials, resources, and audio-visual aids. For inservice and preservice personnel. 2 lectures, 1 activity. Prerequisite: Cons 311, Bio 325, SS 332, PE 337

Ed 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

Ed 500 Individual Study (1-3)

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Prerequisite: Consent of the department head, the graduate major adviser, the supervising faculty member, and Ed 524

Ed 501 Philosophy of Education (3)

The function of philosophy; the meaning of education; significance of present philosophical points of view; education aims and values; democracy and education; the relationship of various philosophical outlooks to educational methods and subject matter. 3 lectures.

Education

Ed 503 Guidance Services (3)

Philosophy and concepts and underlying guidance services. Procedures, techniques, and materials employed by counselors, teachers and others in meeting individual student needs. 3 lectures. Prerequisite: Psy 202, Ed 312

Ed 504 Measuring and Evaluating Learning (3)

Assessing the results of instruction in terms of educational objectives, principles of test construction, criteria for test selection, analysis and interpretation of test results, application to various school subjects, use of other evidences of performance, and models for evaluating innovations and change. 3 lectures. Prerequisite: Psy 202

Ed 507 Staff Administrator Relationships (3)

Principles and practices of personnel administration in school systems: recruitment and selection of personnel; job descriptions and role expectancies; job rewards, benefits, and incentives; rules, regulations, and policies; negotiations and grievance procedures; formal and informal communications; professional ethics and codes of behavior. 3 lectures. Prerequisite: Valid teaching credential or consent of instructor.

Ed 508 Educational Sociology (3)

Sociological backgrounds of school children; effects of social, economic, and political trends and issues on education; problems of leisure, recreation, and occupations; modern interpretations of democratic ideology. Sociological problems are utilized to define the social objectives of the school. 3 lectures.

Ed 510 School Finance and Business Management (3)

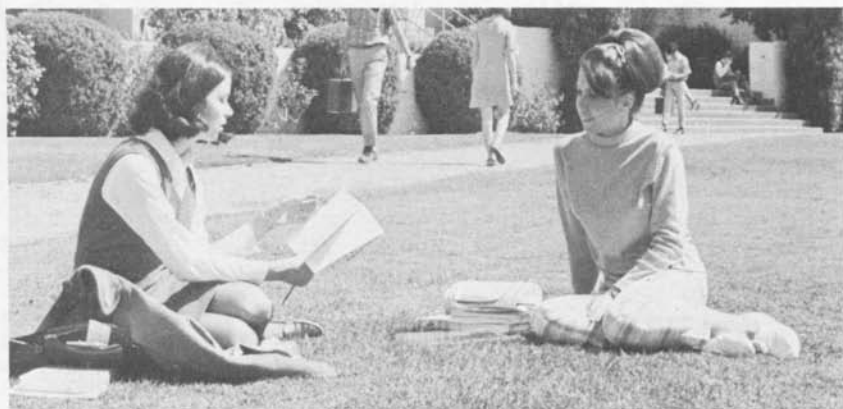
Financial administration of public schools in California. Principles of school support, sources and methods of apportioning funds to school districts. Development of budgets; implications for educational needs at the district, school and classroom levels. 3 lectures. Prerequisite: Valid teaching credential or consent of instructor.

Ed 511 School Law (3)

Legal aspects of school administration, including principles embodied in constitutional, statutory and administrative law, common law, and court decisions with implications for administration and operation of public schools in California. 3 lectures. Prerequisite: Valid teaching credential or consent of instructor.

Ed 512 School Administration (3)

Principles and practices of organizing and administering elementary and secondary schools, including leadership, decision-making processes, human relations, instructional problems, special services, school plant management, educational planning for change, and staff development. 3 lectures. Prerequisite: Valid teaching credential or consent of instructor.



Ed 513 Federal, State, County, and District School Administration (3)

Overview of public education in relation to the formal organization and administration at federal, state, intermediate and local district levels, and the influences upon education exerted by political, social, economic and religious groups and organizations. 3 lectures. Prerequisite: Valid teaching credential or consent of instructor.

Ed 515 Curriculum Development (3)

Strategies for curriculum development in elementary and secondary schools: curriculum models, rationales, innovations and trends; leadership for curriculum study; curriculum design and instructional strategies; and assessing effects of curriculum and instructional change upon learning. 3 lectures.

Ed 516 Supervision of Instruction (3)

Principles and techniques of educational leadership in improving teacher-learner relationships in elementary and secondary schools; organizing, equipping and staffing classes; communicating with individuals and groups; in-service education programs and activities; curriculum development and implementation; and program and staff evaluation. 3 lectures. Prerequisite: Valid teaching credential or consent of instructor.

Ed 517 School-Community Relationships (3)

Strategies for community action between educational institutions and their respective publics. Establishing working relationships with other educational institutions; children and youth; parents and home neighborhoods; and politics and community power structures. Cooperative efforts in resolving contemporary urban and rural community problems. 3 lectures.

Ed 518 Reading Problems in the Schools (3)

Reading problems in the schools including diagnosis of reading deficiencies, remediation, and suitable reading material. 3 lectures. Prerequisite: Ed 434, 440, or permission of instructor.

Ed 519 Teaching the Gifted Child (3)

The nature of the growth and development of gifted children, including physical, social, and achievement aspects. Methods of identifying giftedness, gifted children, and children with special abilities. Study of selected programs for teaching gifted children in California and other states. 3 lectures.

Ed 520 Elementary Reading Programs (3)

School reading programs and classroom organization. Application of research findings to teaching reading. Survey of innovative programs in elementary school reading. For teachers and supervisors. 3 lectures. Prerequisite: Ed 434 or permission of instructor.

Ed 521 Teaching the Culturally Different (3)

Cultural factors that inhibit learning in the school; problems and needs of the disadvantaged child; classroom procedures and materials to facilitate learning and increase educational achievement; preparation for teaching in depressed areas. 3 lectures. Prerequisite: Graduate standing.

Ed 522 Teaching Reading in the Secondary Schools (3)

Principles, procedures, and materials for improving reading in the subject matter areas with students of different backgrounds and abilities in grades 7 through 12. 3 lectures. Prerequisite: Ed 312, 440

Ed 523 Remedial and Special Education (3)

Theory and practice of diagnosing educational and psychological difficulties affecting the ability of children to profit from education. Case study and case conference approaches to understanding and assisting children with learning difficulties. 3 lectures. Prerequisite: Ed 503, Psy 432

Ed 524 Investigative Techniques (3)

Principles and methods of planning and carrying out systematic investigations dealing with learning, teaching, curriculum, instructional planning, pupil personnel services, and other related areas. 3 lectures. Prerequisite: Math 100, Psy 202

Education

Ed 525 Group Guidance (3)

A study of group research, techniques and evaluation with emphasis on practical application in educational settings, group dissemination of occupational-educational information, group counseling and classroom activity groups. 3 lectures. Prerequisite: Ed 503

Ed 527 The Community College (3)

The purpose, history, organization and curriculum of the community college. For persons teaching and planning to teach in the community college. 3 lectures.

Ed 528 Advanced Counseling Critique (3)

Advanced practice in vocational, personal, and educational counseling for students in the pupil personnel program. Counseling theory and procedures, educational and career planning. Application of theory to practical counseling situations. 3 lectures. Prerequisite: Ed 503, 525

Ed 529 Supervision of Vocational and Practical Arts Education (3)

Methods of designing and implementing programs of vocational and practical arts education (applied arts) including agriculture, business, diversified co-operative, distributive, work experience education, homemaking, industrial arts, and trade technical education. 3 lectures.

Ed 539 Educational, Occupational and Community Information (3)

Collecting occupational, educational and community information including community resources such as agencies and organizations that provide services to individuals or groups. Sources and techniques of collecting and imparting such information stressed. 3 lectures. Prerequisite: Ed 503

Ed 540 Appraising Career Development (3)

Appraisal procedures and theory in career guidance and counseling. Synthesis of personal and social data to diagnose and predict career development and choice. 3 lectures. Prerequisite: Ed 503

Ed 541 Administration of Pupil Personnel Services (3)

Organization of pupil personnel services programs, their administration, their evaluation. Use of community resources and a study of laws relating to children and child welfare. 3 lectures. Prerequisite: Ed 503

Ed 544 Work Experience Education (3)

Organization, coordination, supervision, and laws related to work experience education. 3 lectures.

Ed 546 Supervised Field Experience, Guidance and Counseling (3)

Practical application of guidance services and counseling in public schools, colleges, and related community settings. Weekly seminars with College staff included. Prerequisite: Consent of Pupil Personnel Services Committee one quarter prior to enrollment.

Ed 550 Career Education in the United States (3)

Curriculum and purpose of career education in elementary and secondary schools and community colleges. 3 lectures.

Ed 581 Graduate Seminar in Education (1-3)

Group study of contemporary problems in education. Trends, developments, and issues. Total credit limited to 6 units. Prerequisite: Graduate standing.

Ed 588 Administration or Supervision Field Work (3)

Supervised field work in school administration or supervision at the elementary or secondary level; specific assignments made to cover important aspects of school administration or supervision. Prerequisite: Valid teaching credential, Ed 531 or 516, Ed 532 or 512, and consent of instructor.

Ed 590 Seminar in Supervision of Student Teachers (3)

Organization, responsibilities, problems, and procedures in supervising, directing, and evaluating student teachers and student teaching activities. 3 lecture-discussions.

ELECTRICAL ENGINEERING

EE 110 Orientation (1)

Familiarization with the field of electrical and electronic engineering. 1 lecture.

EE 122 Elements of Electricity (4)

Properties of wires, wiring devices and electrical apparatus. Wiring practice. Introduction to poly phase circuits and motors. For Engineering Technology students. 3 lectures, 1 laboratory.

EE 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

EE 201 Electric Circuit Theory (4)

Fundamental electric laws. Electric circuits and circuit theorems. Magnetism and magnetic circuits. Analysis of alternating current, single and three phase circuits using symbolic method (complex phasors). Transmission lines, coupled circuits and transients. For non-electrical engineering majors. 3 lectures, 1 laboratory. Prerequisite: Math 242, Phys 133

EE 209 Basic Electrical Engineering (8)

Combines content of EE 201, 325. Primarily for transfer students. 6 lectures, 2 laboratories.

EE 211, 212 Introductory Electric Circuit Analysis (4) (5)

Basic definitions. Power and energy relationship. Transient and steady state analysis of linear direct and alternating current circuits by mesh and nodal methods. Network theorems, duality, phasor and complex frequency concepts. Magnetic coupling and two-port networks. EE 211: 3 lectures, 1 laboratory; EE 212, 4 lectures, 1 laboratory. Prerequisite: Math 143 or equivalent.

EE 231 Electric Machines (4)

Physical and electrical characteristics of the more common types of DC and AC machinery. Provides background facilitating selection of appropriate machine for a specific job. For non-EE majors. 3 lectures, 1 laboratory. Prerequisite: EE 122 or basic circuits course.

EE 240 Additional Engineering Laboratory (1-2)

Total credit limited to 4 units, with not more than 2 units in any one quarter. 1 or 2 laboratories.

EE 301 Advanced Circuit Analysis (4)

Fourier analysis. Fourier and Laplace transform techniques. Transient analysis. Transfer functions, including use of two-port parameters. Pole-zero and Bode plots. Filter bandwidth requirements and filter network analysis. 3 lectures, 1 laboratory. Prerequisite: EE 212, Math 318

EE 303 Power Transmission (4)

Transmission line parameters and characteristic constants. Power and signal transmission lines and power systems. Symmetric loads and faults. 3 lectures, 1 laboratory. Prerequisite: EE 301

EE 304 Electromechanics (3)

Magnetic fields and circuits, electromechanical energy conversion principles, transducers, transformers, D-C and A-C machines. 3 lectures. Prerequisite: EE 207, EE 212

EE 324 Electrical Systems Design (3)

Elements of electricity. Electric circuits. Direct current voltage, current, and power. Alternating currents. Effective voltage and current. Power factor. Wiring installations. Code requirements. Devices used. Layout of electrical installations. Writing specifications. Primarily for architects. 3 lectures. Prerequisite: Phys 133

Electrical Engineering

EE 325 Energy Conversion Electromagnetics (4)

The fundamentals of electro-mechanical energy conversion. Theory of operation and operating characteristics of transformers, D.C. machines and A.C. induction and synchronous machines. Electrical control devices and systems. For non-electrical engineering majors. 3 lectures, 1 laboratory. Prerequisite: EE 201

EE 326 Ethics in Engineering (2)

Introduction to business and legal aspects of engineering. Ethics as applied to the practice of engineering. 2 activities.

EE 327 Illumination (3)

Theory and practice of illumination. Mechanical and electrical problems in installation and control of lighting sources. Measurement of light. 2 lectures, 1 laboratory. Prerequisite: Consent of instructor.

EE 334 Analysis of Engineering Systems (3)

Methods used in analysis of engineering systems. Application in electromagnetics, control, power, communications, reliability, and energy conversion systems. 3 lectures. Prerequisite: EE 301, Math 318

EE 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department head.

EE 401 Linear Networks Analysis (4)

Linear system defined. Block diagram and signal flow algebra. Fourier transform. Response function of a linear system. Bandwidth-time inverse relationship arbitrary pulse. Power spectral density. Impulse response of linear system. Physical interpretation of weighting function and convolution integral. Introduction to state variables. 3 lectures, 1 laboratory. Prerequisite: EE 301

EE 404 Stochastic Processes in Systems (3)

Application of probabilistic models to solution of system problems in control engineering and power systems. Engineering decision choices among alternative designs, systems and random signals. Analysis of linear systems with random input. 3 lectures. Prerequisite: EE 302 and 334, or consent of instructor.



EE 405 Topological Analysis of Electrical Networks (4)

Network topology. Matrix representation of network equations and graphs. Flow graph techniques. Topological analysis and synthesis of passive, active, and switching networks. 3 lectures, 1 activity. Prerequisite: EE 334

EE 406 Power System Analysis I (4)

Introduction to power systems. Polyphase circuit analysis. Parameters and performance of power transmission lines. Symmetrical faults and loads. Economic aspects. Circuits normalization and denormalization, per unit values. Use of A-C Analyzer. 4 lectures. Prerequisite: EE 303

EE 407 Power System Analysis II (4)

Load flow studies. Economics of power systems. Synchronous machines and faults. Symmetrical components. Unsymmetrical faults. Short circuit current calculations for symmetrical and unsymmetrical faults. Elements of power system stability. 4 lectures. Prerequisite: EE 406

EE 408 Power System Protection and Stability (4)

System and elements of power system protection from lightning and from short circuit currents and overload. 4 lectures. Prerequisite: EE 407

EE 410 Power Control I (4)

Power semiconductor devices. Theory of power diodes, SCR, Triac, Diac, Unijunction transistor, etc., as a modeling of diode and SCR circuits, SCR trigger circuits, analysis of SCR circuit in rectifiers, inverters, and cycloconverters. 3 lectures, 1 laboratory. Prerequisite: EE 332, EL 309

EE 411 Power Control II (4)

Analysis of d-c and a-c motors controlled by rectifiers, inverters, and cycloconverters; modeling of rectifier—d-c motor systems; modeling of inverter—induction motor drive system; regenerative braking; electric propulsion; analog and digital computer study of motor control system. 3 lectures, 1 laboratory. Prerequisite: EE 410

EE 414, 415 Energy Conversion (3) (3)

Energy sources, conversion, and storage, with specific consideration of resources, chemical fuels, batteries, fuel cells, semiconductors, thermoelectricity, thermionic generators, solar energy, MHD, and related topics. 3 lectures. Prerequisite: ME 302

EE 417, 418 Electromagnetic Machines (4)(4)

Transformers. Direct current machines. Analysis in the steady state and transient modes. Alternating current machines. Generalized, operational and dynamic analysis. Unbalanced operations. 3 lectures, 1 laboratory. Prerequisite: EE 304

EE 421 Senior Systems Design (1-3)

Application of engineering systems and analysis to design problems. Creative thinking emphasized. Group and individual assignments. 1-3 activity periods. Prerequisite: Senior standing in Electronic or Electrical Engineering or consent of instructor.

EE 423 Digital Computers (3)

Theory and design. Application to control. 2 lectures, 1 laboratory. Prerequisite: EL 316 and consent of instructor.

EE 427 Analog and Hybrid Computation (4)

Analog computing elements. Speed and accuracy of computation. Analog and hybrid simulation. Use of relays, multipliers, and function generators. Hybrid computation, using memory and decision making. Automatic optimization by hybrid technique. 2 lectures, 2 laboratories. Prerequisite: Engr 251 and EE 301, or consent of instructor.

EE 428 Dynamic Instrumentation (3)

Electrical measurement of non-electrical phenomena. Transducers. Transmission systems. Recorders. Theory and operation. 2 lectures, 1 laboratory. Prerequisite: Consent of instructor.

Electronic Engineering

EE 429 Precise Electrical Measurement (3)

Theory and technique of precise electrical measurement. Primary and secondary electrical standards. Application to measurement of voltage, current, and resistance. 2 lectures, 1 laboratory. Prerequisite: EE 428

EE 431 Control Systems (3)

Automatic feedback control systems. Analysis of linear systems. 3 lectures. Prerequisite: EE 304, 334

EE 432 Control Systems Engineering (3)

An advanced course in analysis and design of control systems based on root-locus, frequency domain and computer approach. Non-linear sampled data and self-adaptive systems. 3 lectures. Prerequisite: EE 431 or consent of instructor.

EE 434 Control Systems Laboratory (1)

Laboratory work in feedback control systems. Recommended to accompany or follow EE 431. 1 laboratory. Prerequisite: EE 304, 334

EE 444 Power Systems Analysis (1)

Solutions of unsymmetrical fault and stability problems on the A.C. analyzer. 1 laboratory. Concurrent: EE 407

EE 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time. Prerequisite: EL 309, EL 319 or EE 423

EE 463 Undergraduate Seminar (2)

Reports and discussions on library study and laboratory research in approved individually selected topics in electrical engineering. 2 meetings.

EE 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

ELECTRONIC ENGINEERING

EL 131, 132 Introduction to Electrical and Electronic Engineering I, II (2) (2)

Description, operation and use of instruments for measurement of electrical quantities, oscilloscopes, power supplies and signal generators. Measurement techniques applied to discrete components, printed and integrated circuits. Schematic drawing, layouts, technical sketching, and industrial standards, symbols and codes. EL 131: 2 activities; EL 132: 2 laboratories.

EL 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

EL 207 Introduction to Electrical Fields (4)

Introduction to fundamental physical concepts underlying electronics, with particular reference to basic electric and magnetic field theory for application to the control of charged particles. 3 lectures, 1 two-hour activity. Prerequisite: Phys 131, Math 143

EL 240 Additional Engineering Laboratory (1-2)

Total credit limited to four units, with not more than two units in any one quarter. 1 or 2 laboratories.

EL 303 Signal Transmission (4)

Introduction to filter theory. Distributed constants and traveling waves. Transmission line parameters and characteristic constants. Lines with and without reflection. Smith Chart, coaxial lines. Measurements, impedance matching, transmission systems. 3 lectures, 1 laboratory. Prerequisite: EL 301

EL 307 Electronic Devices and Circuits (5)

Physical and analytical study of various electron devices with primary emphasis on semiconductor material, diode and transistor theory. Transistor circuit models, basic amplifiers, and biasing. 4 lectures, 1 laboratory. Prerequisite: EL 307

EL 308 Electronic Circuits (5)

Analysis and design of linear small-signal amplifiers, tuned amplifiers, power amplifiers, and feedback. 4 lectures, 1 laboratory. Prerequisite: EE 301, EL 307

EL 309 Electronic Circuits (5)

Analysis and design of power supplies, oscillator, pulse, digital, gating, counting and timing circuits. Piecewise-linear analytical techniques are emphasized. 4 lectures, 1 laboratory. Prerequisite: EE 301, EL 308

EL 313 Analog Computer Techniques (3)

Course designed for mathematics, science and engineering majors other than electronic and electrical. Fundamental principles of analog computers, field of application in science and engineering. Programming techniques. Output devices. Simulation of linear and non-linear systems. 2 lectures, 1 two-hour laboratory. Prerequisite: Math 242

EL 314 Applied Electronics for Non-Engineers (4)

Basic electronic principles, digital, analog, and servo-systems used in scientific instrumentation. Designed for science students with minimal background in electronics. 3 lectures, 1 laboratory. Prerequisite: Math 117 and junior standing in Mathematics, a physical or life science major, or consent of instructor.

EL 319 Logic and Switching Circuits (3)

Fundamentals of Boolean algebra. The simplification of combinational logic circuits using tabular, map, and computer techniques. Combinational circuit synthesis in terms of NAND, NOR and other modern logic circuits. Analysis and synthesis of asynchronous and clocked sequential circuits; basic computer concepts. 3 lectures. Prerequisite: EL 308

EL 321 Electronics (4)

Semiconductor electronic devices and circuits. Rectifiers, amplifiers, feedback oscillators, pulse forming and shaping, frequency response, modulation, detection and computer logic circuits, for non-electronic or electrical engineering majors. 3 lectures, 1 laboratory. Prerequisite: EE 201

EL 322 Instrumentation and Control Systems (4)

Principles of transducers and instruments. Measurement of pressure, strain, velocity, acceleration, temperature, etc. by means of electric devices. Instrumentation systems and measurement error sources. Principles of automatic control. Control of velocity, acceleration, temperature, etc., by means of feedback control systems. Interrelationships between transducer, power amplifier and actuator. For non-electronic or electrical engineering majors. 3 lectures, 1 laboratory. Prerequisite: EL 321, Math 318

EL 327 Electronic Instrumentation and Measurement (4)

Principles and characteristics of instruments and instrumentation systems; analog and digital transducers; A/D conversion; data and signal transmission and amplification problems. Low level signal, high frequency signal, and high accuracy signal measurement problems. Automated instrumentation systems. 3 lectures, 1 laboratory. Prerequisite: EE 301, EL 308

Electronic Engineering

EL 351 Analog Computer Laboratory (1)

Laboratory study of analog computers and auxiliary equipment. Solution of engineering problems and simulation of physical systems on the analog computer. 1 laboratory. Concurrent with or following EE 301.

EL 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

EL 401 Electromagnetic Fields (3)

Electric and magnetic fields, Vector analysis and boundary value problems. Maxwell's equations and the wave equation. Introduction to traveling waves and radiation. 3 lectures. Prerequisite: EL 207, EE 334, EE or EL 303

EL 402 Microwave Engineering (3)

Application of Maxwell's equations and boundary value problems, to wave guide structures. Microwave equivalent circuit theorem. Passive microwave devices including treatment of microwave propagation in ferrites. Measurement principles and technique. 3 lectures. Prerequisite: EL 401

EL 404 Principles of Digital Computers (3)

Organization of typical digital computer. Combinational and sequential switching circuit analysis and synthesis with emphasis on modern electronic devices used in the design of electronic computers. Properties of modern high-speed memory systems. Coding systems. 3 lectures. Prerequisite: Junior standing.

EL 405 Advanced Amplifier Theory (3)

Analysis and design of modern electronic amplifiers and amplifier systems with advanced techniques. Pole-zero analysis, wide-band, lowpass and high-frequency, bandpass amplifiers design using Y and S parameters. Noise analysis. 3 lectures. Prerequisite: EE 301, EL 309

EL 406 Communication Theory (3)

A unified treatment of various types of transmission systems with emphasis on the role of system bandwidth and noise in limiting the transmission of information. Single-side-band AM and various types of pulse modulation systems are included. 3 lectures. Prerequisite: EL 302, 309

EL 407 Digital Computer Subsystems (3)

Design of registers, counters, sequencers, accumulators, encoders, decoders, memories, and other computer subsystems. Use of modern techniques and devices in implementation. Consideration given to cost, speed, and dependability. 3 lectures. Prerequisite: EL 309, 319

EL 408 Digital Computer Systems (3)

Design and interconnection of various parts of a digital computing system. Survey of various input/output and other peripheral units and problems of interfacing these with the central processing unit. Design of sequential circuits with emphasis on control circuitry required in the main frame of a modern computer. 3 lectures. Prerequisite: EL 407, CSc 221 or consent of instructor.

EL 410 Electronic Engineering Reliability (3)

Reliability prediction and reliability design, including redundancy and the allocation problem. Computer reliability prediction and analysis of variability. 3 lectures. Prerequisite: EL 308, Engr 251

EL 411 Passive Network Synthesis (3)

Modern circuit synthesis concepts and methods as applied to typical communication and control systems. Treatment of the approximation problem and techniques of network realization. 3 lectures. Prerequisite: EE 301

EL 412 Analog Computation and Simulation (3)

Development of the concepts of analog computation and simulation, including system modeling, programming and scaling techniques. Application to problems in engineering, and science, including some treatment of non-linear techniques; actual practice. 2 lectures, 1 two-hour activity. Prerequisite: EE 301, EL 308

EL 420 Solid State Electronics I (3)

Fermi-Dirac statistics, mobility and diffusion in semiconductors, temperature dependence of carrier concentration, continuity equation, effects of doping gradients, metal semiconductor contacts, photovoltaic and thermo-electric effects. 3 lectures. Prerequisite: EL 308, Phys 412

EL 421 Solid-state Microelectronics (3)

Systems development and reliability considerations. The physical basis of microelectronics. Properties of surfaces and thin films. Rectification and pn junction systems. Fabrication techniques. Miniature and thin-film circuits. Solid-state circuits and multiple devices. 3 lectures. Prerequisite: EL 309

EL 422 Semiconductor Devices and Models (3)

Physical operation of modern semiconductor devices including high frequency, high power, and switching characteristics. Fundamental solid-state mechanisms that contribute to device performance. Modeling theory to relate these mechanisms to usable equivalent circuits. 3 lectures. Prerequisite: Phys 412, EL 309

EL 423 Microwave Electronics (2)

Klystron amplifiers, reflex oscillators, magnetrons, traveling wave tubes, solid state signal sources, masers, and parametric amplifiers. 2 lectures. Prerequisite: EL 401

EL 424 Antenna Theory and Application (3)

Linear antenna theory. The antenna as a matching device. Antenna directivity, gain, efficiency, resistance, aperture, and reciprocity. Application of antenna theory to various types of antennas. Consideration of terrestrial, tropospheric, and ionospheric propagation. 3 lectures. Prerequisite: EL 401, Math 318

EL 425 Active Network Synthesis (3)

Selected topics in modern network synthesis, using active devices as negative impedance converters, to satisfy prescribed one and two-port immittance and transfer functions using only R and C elements. 3 lectures. Prerequisite: EE 301, EL 308

EL 427 Electronic Systems Information Theory (3)

An introduction to information transmission theory and coding theory, covering information and entropy, Markov information sources, code properties, coding theorems; Shannon-Fano Codes, linear codes, hamming codes, continuous channels, Gaussian signals and channels. 3 lectures. Prerequisite: Consent of instructor.

EL 429 Television Engineering (2)

Generation, transmission and reception of television signals with particular reference to the design and engineering of receiver circuits and systems. Design of CATV systems. Specifications of TV systems used in industry, business, and medicine. 2 lectures. Prerequisite: EL 309

EL 430 Computer-Aided Circuit Design (2)

Analysis and design of active and passive electronic circuits using digital computers. Graphic terminal and time-sharing systems. Survey of available CAD programs. Applications of ECAP program for dc, ac and transient analysis, including tolerance, sensitivity, optimization and device modeling. 1 lecture, 1 activity. Prerequisite: Engr 251, EL 309 or senior standing.

EL 436 Microwave Measurements (3)

Transmission line characteristics and measurements. Microwave concepts; techniques of rf field measurements, and microwave transmission line measurements. For Measurement Science majors. 2 lectures, 1 laboratory. Prerequisite: EL 322 or equivalent.

Engineering

EL 441 Microwave Laboratory (1)

Experimental investigation of vacuum-tube and solid state microwave sources, crystal and power detectors, coaxial cables, directional couplers and n-port devices. Measurement of SWR by slotted line and reflectometer techniques. Techniques for measurement of attenuation, frequency and power. Modulation techniques and spectrum analysis. 1 laboratory. Prerequisite: EL 303, 401

EL 445 Advanced Amplifier Design Laboratory (1)

Experimental investigation employing advanced techniques. Design of electronic amplifiers and amplifier systems utilizing recently developed components. 1 laboratory. Concurrent with or following EL 405

EL 447 Digital Subsystems Laboratory (1)

Laboratory analysis of logic circuits. Synthesis of counters, registers, adders, and other digital subsystems using small and medium scale integrated circuits. 1 laboratory. Prerequisite: EL 319

EL 448 Digital Computer Systems Laboratory (1)

Laboratory analysis and synthesis of digital computer systems and subsystems. Use of small and medium scale integrated circuits and preconstructed digital subsystems. 1 laboratory. Prerequisite EL 407, EL 447

EL 451 Solid State and Microelectronic Laboratory (1)

Laboratory investigation of electronic properties of semiconducting materials. Fundamental experiments in fabrication and evaluation of solid state and micro-electronic devices and circuits. 1 laboratory. Prerequisite: EL 421

EL 455 Active Network Synthesis Laboratory (1)

Advanced laboratory study of sensitivity and stability of active networks prescribed for realization of transfer functions by active network synthesis techniques. Formal experiments and individual project work. 1 laboratory. Prerequisite: EL 425

EL 456 Communication Systems Laboratory (1)

Methods of analog and digital modulation and demodulation. Effect of the transmission medium on modulation and coding techniques. 1 laboratory. Concurrent: EL 406

EL 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects results are presented in a formal report. Minimum 120 hours total time. Prerequisite: EL 309, 319

EL 463 Undergraduate Seminar (2)

Discussion of new developments in the fields of communications and industrial electronics, with particular reference to fields of employment. Job analysis. 2 lectures.

EL 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

ENGINEERING

Engr 202 Introduction to Life Support Systems (3)

Systems for support of life during adverse conditions: insufficiency of air, food and water, excess of acceleration, impact, vibration, pressure, vacuum, temperature, radiation, and noise. 3 lectures. Prerequisite: Bio 101 or equivalent.

Engr 215 Development of Modern Engineering (3)

Survey of significant engineering advances through the ages with emphasis on late 19th and 20th century. Theory and application. Topics selected from recognized engineering disciplines. 3 lectures. Prerequisite: Sophomore standing

Engr 251 Digital Computer Applications (2)

Programming techniques and procedures with applications to several selected engineering problems from a variety of course situations. Actual problem solutions by means of a digital computer will be required. 2 activities. Prerequisite: Math 142 or 132, Phys 131 or 121

Engr 260 Engineering and Technology Internship (4-8)

The selected student will spend alternate quarters in industry or in a government installation applying and developing abilities. Total credit limited to 8 units. Prerequisite: Consent of instructor

Engr 270 Introduction to Ocean Engineering (3)

Introduction to the engineering description of the ocean environment, measurements, communications, materials, installations and equipment. 3 lectures. Prerequisite: Chem 121, Phys 123, Math 132, a course in Biology.

Engr 301 Technology in the 20th Century (3)

The role of science, engineering and technology in the twentieth century. Effects of technological change, the function of the scientist-engineer in society. The computer as a tool, case studies of systems to compare alternative approaches to problem solving. 3 lectures. Prerequisite: Junior standing

Engr 311, 312 Mechanical and Electrical Systems (3-3)

Introduction to design and installation of heating, air conditioning, plumbing, fire protection and electrical systems. Emphasis on structural and architectural implications of system types, lighting and power requirements, code constraints, and first and operating costs. 3 lectures.

Engr 409 Introduction to Medical Engineering (3)

Introduction to medical systems—analysis and synthesis, instrumentation and patient monitoring. Applications of electrical engineering to medicine. 3 lectures. Prerequisite: Bio 101, Senior standing and permission of instructor.

Engr 410 Engineer Examination Review (2)

Review of engineering fundamentals including mathematics, statics, dynamics, strength of materials, fluid mechanics, electricity, thermodynamics, heat transfer, chemistry, and economics, in preparation for Engineer-in-Training and Professional Engineer examinations. Not acceptable for graduate credit. 2 lectures. Prerequisite: Senior standing in Engineering, Architecture, or Agricultural Engineering.

Engr 438, 439 Systems Engineering (3) (3)

Preliminary design of a complex engineering system. Emphasis on overall problems involved. Requires concentrated study of some aspect or component of the system. Opportunity for creative engineering practice. Written and oral reports made by the entire design team. 3 activities.

Engr 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their field of employment. Project results are presented in a formal report. Minimum 120 hours total time.

Engr 463 Undergraduate Seminar (2)

New developments, policies, practices, and procedures. Each individual is responsible for the development and effective presentation of topics in his area of special emphasis. 2 meetings. Prerequisite: Senior standing.

Engr 500 Individual Study (1-3)

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Prerequisite: Consent of department head, graduate adviser and supervising faculty member.

Engineering

Engr 503 Advanced Structural Analysis (3)

Deformations of aircraft structures due to static and dynamic loads. Computation of natural mode shapes and frequencies. Determination of dynamic stress fields in aircraft due to transient motions caused by external forces. 3 lectures. Prerequisite: ME 427 or senior level structural design course.

Engr 504 Vehicular Design (3)

Selected vehicular design problem involving the use of creative and analytical talents, and engineering judgment. 3 lectures. Prerequisite: Engr 503

Engr 505 Theoretical Aerodynamics (3)

Fundamentals of analytical aerodynamics, potential flow, vortex theory, circulation, Kutta Joukowski theorem, lifting line theory, three dimensional lift and drag of wings, performance, stability and control. 3 lectures. Prerequisite: Aero 303 or equivalent.

Engr 506 Elements of Rocket Propulsion (3)

Analysis and design of liquid and solid rockets using basic design parameters such as droplet atomization, droplet and partial combustion, heat transfer, combustion stability and control, and thermochemical computations. 3 lectures. Prerequisite: Aero 401 or equivalent.

Engr 507 Fuels and Propellants (3)

Properties of liquid, solid, and gaseous fuels and propellants. Combustion and reaction thermodynamics; theoretical specific impulse computation. Flame theory; ionization and high temperature gas dynamics. 3 lectures. Prerequisite: Graduate standing

Engr 508 Variational Principles in Solid Mechanics (3)

Potential energy method; direct and indirect methods of the calculus of variations, effects of extensional deformation and initial curvature, applications to straight and curved beams, plates. Complementary energy principle; development of compatibility equations; applications to St. Venant torsion and shear lag, frames. 3 lectures. Prerequisite: 400-level course in structures.

Engr 511 Electric Machines Theory (3)

Advanced topics in electric machines theory and design. 3 lectures. Prerequisite: EE 332 or equivalent.

Engr 513, 514 Control Systems Theory (3) (3)

State variables of open loop and closed loop dynamic systems. Mathematical models. Concepts of sensitivity, controllability and observability. Discrete control. Stability by Lyapunov's functions. Adaptive and optimal control. Bellman's dynamic programming and Pontriagin's maximum principle. Random processes, and stochastic control. 3 lectures. Prerequisite: EE 431 or equivalent and consent of the instructor.

Engr 516 Advanced Electromagnetic Theory (3)

Green's functions and eigenfunction expansions, reflection and refraction, radiation of moving charges and special relativity, propagation in anisotropic media, application of Maxwell's equations to waveguide theory. Circuit theory for waveguiding systems. Scattering matrices of microwave junctions. Special topics. 3 lectures. Prerequisite: EE 301 and EL 401, or equivalents and consent of the instructor.

Engr 518 Advanced Power System Analysis (3)

Transient-phenomena and stability, computer methods in analysis, economic and stability problems, transient system models. Single and multigenerator solution of Swing equation, optimum load frequency control, dynamic optimization. 3 lectures. Prerequisite: EE 407

Engr 519 High Voltage Transmission (3)

EHV Transmission (AC and DC), underground transmission, long lines, surge phenomena, corona effects, system protection, reliability, radio noise. 3 lectures. Prerequisite: EE 407

Engr 520 Analog Computation and Simulation (3)

Principles and practice of analog computation and simulation; programming and scaling techniques. Application to problems in engineering, mathematics, and physics with emphasis on non-linear techniques including function multiplication and generation, output devices. 2 lectures, 1 two-hour activity. Prerequisite: Graduate standing or permission of instructor.

Engr 521 Digital Systems (3)

Organization of digital systems, primarily the modern general purpose, high speed digital computer; arithmetic units, control units, memories, peripheral equipment. Cost and speed trade-offs in the design of such systems. 3 lectures. Prerequisite: EL 404 or equivalent and consent of instructor

Engr 522 Computation Systems (3)

Organization of modern electronic computation systems (digital and analog), their capabilities and limitations. Design and applications of hybrid (analog and digital) computation systems. 2 lectures, 1 two-hour laboratory. Prerequisite: EL 521 or EL 408 or equivalent

Engr 523 Microwave Devices (3)

Theory of microwave devices including klystrons, magnetrons, traveling wave tubes, bulk semiconductor oscillators, parametric amplifiers, and harmonic generators. Coupled mode theory, noise measure, Manley-Rowe relations, and space charge waves. 3 lectures. Prerequisite: EL 401 or equivalent and consent of instructor.

Engr 524 Solid State Electronics (3)

Physical theory of solid-state devices. Properties of metal-semiconductor junctions and p-n junctions. Derivation of properties of diodes, transistors, and four-layer devices from basic physical and mathematical considerations. 3 lectures. Prerequisite: Phys 412 or equivalent.

Engr 525 Stochastic Processes for Engineers (3)

Stochastic processes used in the solution of engineering problems. Stationary processes and power spectra; Gaussian processes, Poisson processes, Marhov and Semi-Marhov processes. Applications to the problems of filtering and prediction (Wiener & Kalman filters), and to the problems of queuing traffic congestion, flow of material and equipment in a system. 3 lectures. Prerequisite: Stat 321, EE 404 or equivalent and consent of instructor.

Engr 526 Modern Communication Theory (3)

Introduction to modern communication theory. Representation of random signals; signal detection and selection, estimation of signal parameters and modulation. Optimum receiver principles, application to digital communications and radar systems. 3 lectures. Prerequisite: EL 406, either EL 410 or EE 404, and consent of instructor.

Engr 527 Advanced Network Theory (3)

Circuits, matrices, and linear vector spaces; linear graph theory; state equations for linear networks in normal form; eigenvalues and eigenvectors; reciprocal networks; normal modes. 3 lectures. Prerequisite: EL 302 or equivalent.

Engr 528 Solid State Devices (3)

Physical principles and operational characteristics of selected solid state devices with particular emphasis on the newly developed opto-electronic, Impatt and bulk-effect devices. Small and large signal analysis, device circuit models, optical high-field, thermal and noise properties. Device technology and engineering applications. 3 lectures. Prerequisite: EL 307, Phys 412 or equivalent

Engr 529 Noise in Electron Devices (3)

Physical sources of electronic noise, noise classification and characterization, noise in vacuum tubes, semi-conductors, p-n junction diode, Schottky barrier diode, bipolar and unipolar transistors, low-noise amplifiers, minimum noise considerations. Noise generation and measurement. 3 lectures. Prerequisite: EL 307 or equivalent.

Engineering

Engr 532 Industrial Ventilation and Exhaust Systems (3)

Environmental contamination, dispersion mechanisms, industrial comfort criteria; control of temperature, humidity, cleanliness and motion of air. Natural and forced ventilation, control velocities, air-handling systems and components. 3 lectures. Prerequisite: Graduate standing and consent of instructor.

Engr 533 Aerosol Technology (3)

Definition, theory and measurement of particle properties, particle statistics, size distribution, particle transport, gas cleaning, sampling of airborne contaminants. 3 lectures. Prerequisite: Graduate standing and consent of instructor.

Engr 534 Advanced Design of Air Pollution Control Systems (3)

Comprehensive problems in air conservation. Methods of analysis, design of unit operations and processes for environmental engineering facilities. 3 lectures. Prerequisite: Graduate standing and EnvE 325

Engr 535 Advanced Wastewater Treatment (3)

Operations and processes used in tertiary treatment. Chemical coagulation, flocculation, sedimentation, filtration, adsorption. Methods for removal of phosphorous, nitrogen, solids and organics. Integration of advanced wastewater treatment processes. 3 lectures. Prerequisite: Consent of instructor.

Engr 541 Advanced Operations Research (3)

Models for mathematical programming and operations research. Mathematical programming topics in linear programming, network analysis, and dynamic programming. Operations research models will include queuing, inventory models, simulation, and Monte Carlo. Special analysis problems in non-linear programming and integer programming. 3 lectures. Prerequisite: IE 333, CSc 219, Stat 322, or consent of instructor.

Engr 542 Reliability Engineering (3)

Theory and techniques for determining the reliability of systems and system elements. Influence of failures in series, parallel, and redundant designs. Failure modes and effects. Frequency distributions of failures and failure rates. Methods of estimating, predicting, measuring, and testing for reliability and effectiveness. 3 lectures. Prerequisite: IE 430, Stat 322, 425; or consent of instructor.

Engr 543 Advanced Human Factors (3)

Theory and application of man-machine relations and system design. Concepts of mathematical models, human information input channels, decision making based on capability of human operator. 2 lectures, 1 laboratory. Prerequisite: IE 319 or equivalent and a course in biology.

Engr 550 Kinematic Analysis and Design (3)

Analysis and design of mechanical linkages by means of geometric and algebraic methods. Optimization studies. 3 lectures. Prerequisite: ME 324 or equivalent.

Engr 551 Mechanical Systems Analysis (3)

Various system modeling methods applied to mechanical systems. System stability studies and system optimization methods. 3 lectures. Prerequisite: Consent of instructor.

Engr 552 Conductive Heat Transfer (3)

Theory of steady-state and transient conduction in isotropic and anisotropic media. Development of differential equations, solutions by series, conformal mapping, transforms, finite differences. Concentrated and distributed heat sources. 3 lectures. Prerequisite: IE 430, Stat 322, 425; or consent of instructor.

Engr 553 Convective Heat Transfer (3)

Analysis of convective transfer of energy, mass and momentum. High speed flow and ablation. Phase change heat transfer. 3 lectures. Prerequisite: Env E 313. ME 342, Math 318

Engr 556 Stability of Structural Systems (3)

Static and dynamic analysis of structural and mechanical systems, stability analysis by solution of differential equations, energy methods, perturbation methods. Buckling of columns, torsional buckling, dynamic buckling. 3 lectures. Prerequisite: Consent of instructor.

Engr 561 Electronic Processes in Metals (3)

Nature of metallic bond, band theory, role of Fermi surfaces, electrical and magnetic properties, semimetals, superconductors, liquid metals. 3 lectures. Prerequisite: Phys 412 or 452

Engr 562 Mechanical Metallurgy (3)

Analysis of stress and strain in solids; elements of theory of elasticity and plasticity, and their applications to metal forming. Residual stresses, theory of dislocations, theory of recrystallization, effects of temperature and rate of loading; fracture mechanics, fatigue and creep. 3 lectures. Prerequisite: Met 306 or consent of instructor.

Engr 563 Metallurgical Physical Chemistry and Thermodynamics (3)

Theory and application of metallurgical, physical, chemical, and thermodynamic principles to solid state reactions. Behavior of metals and materials. 3 lectures. Prerequisite: Chem 305, 306, ME 302 or equivalent, or consent of instructor.

Engr 564 Theory of Stress Corrosion Cracking (3)

Stress corrosion cracking, hydrogen embrittlement, liquid metal embrittlement, corrosion fatigue, and other failure modes induced by specific environment. 3 lectures. Prerequisite: Met 424, Chem 306, ME 212

Engr 599 Design Project (Thesis) (2) (2) (5)

Each individual or group will be assigned an industrial design project for solution under faculty supervision as a thesis requirement for the Master of Engineering degree. An appropriate experimental or analytical thesis may be accepted.

ENGINEERING TECHNOLOGY

ET 121 Air Conditioning and Refrigeration Principles (3)

Introduction to principles of commercial and industrial air conditioning and refrigeration systems. Installation, service maintenance, and cost estimating. 2 lectures, 1 laboratory. Prerequisite: Phys 121

ET 122, 123 Environmental Graphics (2) (2)

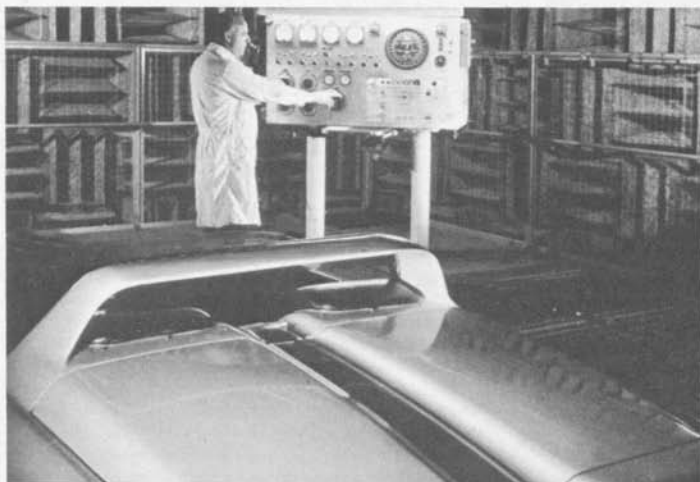
Principles and practices of mechanical and architectural graphics applied to the development of the spatial concepts essential to the design and installation of environmental systems. 1 lecture, 1 laboratory.

ET 124 Elements of Electronics (3)

Fundamentals of electronic components and unit circuits. Application of unit circuits in electronic systems. Introduction of electronic instrumentation and industrial control. Properties of components and functions of basic circuits. Introduction to both the analog and digital computers with application to engineering problems. 2 lectures, 1 laboratory.

ET 125 Electronic Instrument Practices (4)

Analysis of selected electronic instruments and transducers, their application in the field of measurement. Testing for and repair of malfunctioning equipment. Instrumentation used in measuring voltage, current, waveform, frequency and phase. 3 lectures, 1 laboratory. Prerequisite: ET 124



ET 131 Introduction to Engineering Drafting (1)

Basic instruction in drafting techniques and equipment. Geometric constructions for drafting. Basic principles and practices of isometric, oblique, and multiview drawing systems. 1 laboratory.

ET 137 Elements of Machinery (3)

Selection of mechanical fasteners, fittings, chains, belts. Assembly and adjustment of precision components, lubrication and servicing of complex machinery. 2 lectures, 1 laboratory.

ET 141 Applied Descriptive Geometry (2)

Graphical solutions of problems involving points, lines and planes in three-dimensional space by method of multiview projection. Intersections and development of geometric solids. Application to engineering design. 2 laboratories. Prerequisite: One year of high school drafting or ET 131

ET 142 Engineering Drawing Systems (2)

Multiview and pictorial drawing. Detail and assembly drawings. Conventional industrial drafting practices including sectioning and dimensioning techniques. Role of the engineer in current industrial drafting organizations. 2 laboratories. Prerequisite: ET 141

ET 143 Engineering Graphics (2)

Vector diagrams. Gears and cams. Graphical mathematics. Functional scales. Introduction to alignment charts and monograms. Industrial drafting systems and practices. Interpretation of specialized types of technical drawings, including architectural, structural, welding, piping, diagrammatic and electrical. 2 laboratories. Prerequisite: ET 142

ET 151 Fundamentals of Technical Drawing (2)

Basic theory and application of multiview and pictorial projection. Current industrial practices and standards. Includes sectioning, techniques of dimensioning, detail drawings, and assembly drawings. Freehand sketching and interpretation of engineering drawings. 2 laboratories. Prerequisite: High school drafting or ET 131

ET 153 Interpretation of Technical Drawings (1)

Basic principles of technical drawing. Reading drawings made by multiview and pictorial projections systems. Interpretation of specialized types of technical drawings including electrical, diagrammatic, architectural, structural. Current industrial symbols and standards. Freehand sketching techniques. 1 laboratory.

ET 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of the department head.

ET 201 Air Conditioning and Refrigeration Codes (2)

Introduction to current federal, state, and local codes for equipment and human safety as applied to building plumbing, heating, ventilating, refrigeration, and air conditioning systems. 2 lectures.

ET 221 Mechanical Equipment of Buildings (3)

Application of engineering analysis and building code requirements in the design of building systems for handling water supplies, liquid wastes, fuel, gas and ventilation. Related systems connecting groups of buildings, health and accident hazards involved. 2 lectures, 1 laboratory. Prerequisite: Phys 132

ET 232 Electronic Circuits and Devices I (4)

Semiconductor devices and circuits. H-parameters and load line techniques in analyzing amplifiers. Computation of current, voltage, and power gains, input and output impedances. Bias stability and leakage current considerations. Conventional and Esaki diode circuits, AND and OR gates. 3 lectures, 1 laboratory. Prerequisite: EL 132, Math 117

ET 233 Electronic Circuits and Devices II (4)

Analysis of field effect transistor and vacuum tube amplifier circuits. Application of device parameters in gain calculations; characteristic curves. DC power supplies; active current and voltage regulation. NAND and NOR gates, astable, bistable and monostable multivibrator circuit analysis. 3 lectures, 1 laboratory. Prerequisite: ET 232

ET 234 Passive Network Analysis (4)

Basic passive network analysis. Review of dc circuits and application of Thevenin, Norton and Millman theorems to steady state alternating current networks. Use of complex numbers (j -operator) in circuit analysis. Series-parallel equivalent circuits of transformers and reflected impedances. Introduction to RC and RL transients. Calculation of average and RMS values of waveforms. 3 lectures, 1 laboratory. Prerequisite: EL 131, Math 132

ET 237 Hydraulic Device Applications (3)

Flow diagrams with Joint Industrial Council standards, hydraulic and pneumatic components, sequence logic and travers limit controls. Selection of pumps and distribution of fluid power; fluid damping of mechanical shock. 2 lectures, 1 laboratory. Prerequisite: ET 137, Phys 123

ET 240 Additional Engineering Technology Laboratory (1-2)

Elective project work. Total credit limited to 4 units with not more than 2 units in any quarter. 1 or 2 laboratories.

ET 246 Engineering Drawing (2)

Fundamental principles and practices in construction drawings, piping, welding and topographic drawing. Special projects in the area of major interest. Application to current industrial methods and systems. 2 laboratories. Prerequisite: ET 142

ET 313 Plumbing and Building Sanitation (3)

For students in the School of Architecture and Environmental Design. Calculation of water supply and consumption. Fire protection and sprinkler systems. Plumbing and drainage. Gas services. Application of principles to specific elements of engineering structures. 3 lectures.

ET 320 Mechanisms (4)

Motion of machine parts. Graphical methods for determining displacements, velocities, and accelerations in linkages, cams, gears, and other mechanical assemblies. 2 lectures, 2 two-hour laboratories. Prerequisite: Phys 121, ET 142

Engineering Technology

ET 321 Air Distribution Systems (3)

Materials and techniques in fabrication and installation of air ducts for heating, ventilating, refrigerating, and air conditioning. Introduction to fabrication of air handling equipment and related accessories for high and low velocity systems. 1 lecture, 2 laboratories. Prerequisite: EnvE 233 or ME 231

ET 331, 332 Refrigeration Systems (3) (3)

Operation, installation, and supervision of medium and low temperature refrigeration systems for food and product processing and storage using various staging systems. Cold storage and building requirements for efficient operation. Low temperature testing and cryogenic refrigeration. Transport refrigeration systems. 2 lectures, 1 laboratory. Prerequisite: EnvE 233

ET 333 Introduction to Microwaves (4)

Microwave devices, Klystrons, reflex oscillators and solid state sources. Introduction to traveling waves, transmission lines, and wave guides, wave modes, guide terminations and standing waves. Smith Charts. Microwave antennas. 3 lectures, 1 laboratory. Prerequisite: ET 233, Phys 123

ET 334 Digital Computer Circuits and Organization (4)

Digital circuit structures and responses. Design of combinational circuits and analysis of sequential circuits. Coding systems. Arithmetic circuits. Properties of high-speed memory. Organization of a typical digital computer. 3 lectures, 1 laboratory. Prerequisite: CSc 218, ET 233

ET 337 Instrumentation of Mechanical Systems (3)

Remote reading and control devices, position indicating, automatic warning, primary servo-systems. 2 lectures, 1 laboratory. Prerequisite: ET 237

ET 344 Advanced Design Graphics (2)

Preparation of design layouts. Detail and assembly drawings for production. Dimensioning theory as applied to modern engineering practices including numerical control systems. 2 laboratories. Prerequisite: ET 142

ET 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation of techniques, studies or laboratory applications of selected problems. Total credit limited to 4 units, with maximum of 2 units per quarter. Prerequisite: Permission of department head.

ET 421, 422 Applied Machine Design (4) (4)

Machine design emphasizing graphical techniques, feasibility models, and utilization of standard and special elements. Laboratory includes solution of realistic design projects by student teams. 2 lectures, 2 laboratories. Prerequisite: ET 344, 320; Aero 202



ET 425, 426 Air Conditioning Systems (3) (3)

Application of complete air conditioning consisting of heating, ventilation, humidification, dehumidification, refrigeration, air pollution, water treatment and control equipment for commercial and industrial applications. 2 lectures, 1 laboratory. Prerequisite: ET 332

ET 431 Active Linear Circuits (4)

RC coupled amplifiers; low frequency roll-off, Miller effect, gain-bandwidth product, pulse testing and Bode plots, push-pull and complementary symmetry power amplifiers. Negative feedback; Nyquist stability criteria, reduction of block diagrams for closed loop analysis. Positive feedback and sinusoidal oscillators; Barkhausen criteria for oscillation. Operational amplifiers; integration and differentiation of waveforms, gain shaping and active filtering. Dual input integrated circuits. 3 lectures, 1 laboratory. Prerequisite: ET 233, 234, Math 133

ET 432 Automatic Control (4)

Electronic and electromechanical systems used in servomechanisms. Open and closed loop frequency response. Bode plots. Introduction to root locus. Amplification and control systems for automatic control of sequential and continuous processes. 3 lectures, 1 laboratory. Prerequisite: ET 431, ME 206

ET 433 Communication Systems (4)

Fourier analysis of signal waveforms. Continuous (AM, SSB, DSB, FM and PM) and discrete (PAM, PDM, PPM, and PCM) modulation. Frequency spectra, techniques of generation, demodulation. Antennas and radio receivers. 3 lectures, 1 laboratory. Prerequisite: ET 333, ET 431

ET 437 Mechanical Component Selection (4)

Design of housings, frames, chassis; selection of bearings, clutches, brakes; cost estimating and weight analysis; emphasis on logical arrangement of machine components within basic mechanical structure. 2 lectures, 2 laboratories. Prerequisite: ET 337, Aero 202, Weld 235

ET 438 Mini-Computer Technology (4)

Analysis of mini-computer circuits. Organization of circuits into a complete computing system. Techniques for location of circuit malfunctions using computer maintenance manuals and laboratory equipment. 3 lectures, 1 laboratory. Prerequisite: ET 334

ET 439 Instruments and Controls (3)

Application of instrumentation and automatic controls to heating, ventilation and air conditioning systems. 2 lectures, 1 laboratory. Concurrent: ET 331

ET 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects are typical of problems graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time. Prerequisite: Senior standing.

ET 463 Undergraduate Seminar (2)

Special studies and technical developments in the field. Individual reports on important technology in the engineering technology field. 2 meetings.

ET 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

ENGLISH

Engl 100 Applied English Composition (3)

Concentrated work in English composition, letter writing, reports, and language usage. May not be substituted for Engl 104 or Engl 105. Not open for credit to students with credit in college English. 3 lectures.

Engl 104 Freshman Composition (3)

Practical study and application of techniques of exposition. Critical reading of model essays. Frequent writing assignments. 3 lectures.

Engl 105 Freshman Composition (3)

Practical study and application of persuasion and argument. Introduction to library research. Less frequent but more intensive writing assignments culminating in an original research paper. Readings for critical analysis. 3 lectures. Prerequisite: Engl 104

Engl 114 English Composition (4)

Practical study and application of techniques of exposition. Critical reading of model essays. Frequent writing assignments. 4 lectures.

Engl 115 English Composition (4)

Practical study and application of persuasion and argument. Introduction to library research. Less frequent but more intensive writing assignments culminating in an original research paper. Readings for critical analysis. 4 lectures. Prerequisite: Engl 114

Engl 123 Intensive English (3)

For the non-native speaker of standard English who needs additional work with English as a foreign language. Practice in pronunciation, sentence structure, reading and composition. Individual work in the language laboratory. 3 two-hour laboratories.

Engl 124, 125, 126 Intensive Composition (3) (3) (3)

Review of English fundamentals. Reading, letter writing, and composition. Introduction to forms of exposition and logic. Use of reference materials and preparation of term paper. Development of effective style. Also for the speaker of non-standard English. May be substituted for Engl 104, 105 or 114, 115. 3 lectures. Prerequisite: Satisfactory score on English language test.

Engl 204 Introduction to Genres (4)

Understanding the elements of fiction, drama, and poetry through guided discussion of significant examples of each of the major genre forms. Credit not allowed for both Engl 204 and Engl 207. 4 lectures. Prerequisite: One composition course.

Engl 205 Early Children's Literature (3)

Evaluation of stories, plays, and poems which are suitable for introducing literary values in pre-school through third grade. 3 lectures. Prerequisite: One composition course or consent of instructor.

Engl 206 Introduction to Linguistics (3)

Overview of linguistics from its origin to present forms and practices, vocabulary, areas of study, practical applications. 3 lectures. Prerequisite: One composition course or consent of instructor.

Engl 207 Introduction to Literature (3)

Introduction to major forms of literature. Study in depth of selected works with reading for appreciation. May not be elected by English majors. Credit not allowed for both Engl 204 and 207. 3 lectures. Prerequisite: Engl 104 or 114

Engl 208 Introduction to American Literature (4)

Literary perspectives on the American experience through selected readings from representative American authors. May not be elected by English majors. Not open for credit to students with credit in Engl 311, 312, or 313. 4 lectures. Prerequisite: Engl 104 or 114

Engl 209 Intermediate Children's Literature (3)

Evaluation of stories, plays, and poems which are suitable for introducing literary values in grades 4 through 8. 3 lectures. Prerequisite: One composition course or consent of instructor.

Engl 210 Introduction to Shakespeare (4)

Selected readings in Shakespeare. Course is designed for General Education. 4 lectures. Prerequisite: One composition course.

Engl 211, 212 Introduction to European Literature (4) (4)

Directed readings in European literature from the Greeks and Romans to the present, exclusive of the British. 4 lectures. Prerequisite: One composition course.

Engl 214 Afro-American Literature (4)

Selected readings in Afro-American literature. 4 lectures. Prerequisite: One composition course.

Engl 215 Mexican-American Literature (4)

Selected readings in Mexican-American literature in translation. 4 lectures. Prerequisite: One composition course.

Engl 218 Report Writing (3)

Forms of communication used in science and industry. Letters, reports, proposals, and articles. Extensive writing practice. 3 lectures. Prerequisite: One composition course.

Engl 219 Technical Writing (3)

Content, style, design, and production of communications such as data sheets, manuals, brochures, news releases, and advertisements. Extensive writing and editing. 3 lectures. Prerequisite: One composition course.

Engl 221, 222 British Literature (4) (4)

Selected readings in British literature from the beginning to the mid-20th century. 4 lectures. Prerequisite: One composition course.

Engl 300 Advanced Composition (3)

Application of grammatical and rhetorical principles to writing. Production of clear, well-planned, effective prose. 3 lectures.

Engl 301 Modern English Grammar (4)

Linguistic analysis of the English language. Phonology, morphology, and syntax. Traditional, descriptive-structural, and transformational-generative grammars. 4 lectures. Prerequisite: One composition course.

Engl 303 History of the English Language (4)

A study of the development of the English language from its origins to its present forms and practices. Required of all English majors. 3 lectures. Prerequisite: Engl 105 or 115, 221

Engl 304 Advanced Composition—Non-Fiction (4)

Instruction and practice in writing, revising, and evaluating various forms of non-fiction. 4 lectures. Prerequisite: One composition course.

Engl 305 Advanced Composition—Narrative Writing (4)

Instruction and practice in writing, revising, and evaluating various kinds of narrative writing. Introduction to types of critical writing. 4 lectures. Prerequisite: Engl 304

Engl 310 Corporate Communication (3)

Instruction and practice in forms of communication characteristic of business and industry. 3 lectures. Prerequisite: Engl 104 or 114

English

Engl 311, 312 American Literature (4) (4)

Directed readings in American writers from Colonial times to the present. 4 lectures. Prerequisite: One composition course.

Engl 316 Readings for Young Adults (3)

A survey of readings in literature, suitable for use in secondary schools. 3 lectures. Prerequisite: One composition course.

Engl 317 Modern Drama (3)

A survey of British and American Drama of the 20th century. 3 lectures. Prerequisite: Engl 204

Engl 319 The Bible as Literature (3)

The Old and New Testaments with historical background. Literary forms and characteristics of Hebraic writing. Appreciation of the far-reaching use of Biblical narrative and reference in literature, speeches, art, drama, and modern film. 3 lectures.

Engl 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of the department head.

Engl 410 Chaucer (4)

Selected readings from Chaucer, with emphasis on the literary background, language changes, and scholarship. 4 lectures.

Engl 411 Milton (4)

A study of Comus, Lycidas, Paradise Lost, Paradise Regained, and Samson Agonistes, with some attention to the minor poems. 4 lectures.

Engl 414 Significant World Writers (4)

Study in depth of selected world writers, as individual writers or in groups. Each course will have a subtitle descriptive of the content. May be repeated to 8 units. 4 lectures. Prerequisite: Engl 211

Engl 415 Modern Novel (3)

Readings in representative 20th century novels with special emphasis on origins, form, style, and ideas. 3 lectures. Prerequisite: Engl 204 or 9 units of literature.

Engl 416 Modern Poetry (3)

Study of poetry as an art expression of the 20th century. 3 lectures. Prerequisite: Engl 204 or 9 units of literature.

Engl 417 Significant British Writers (4)

Study in depth of selected British writers, as individual writers or in groups. Each course will have a subtitle descriptive of the content. May be repeated to 8 units. 4 lectures. Prerequisite: Engl 221, 222, 223 or consent of instructor.

Engl 418 Significant American Writers (4)

Study in depth of selected American writers, as individual writers or in groups. Each course will have a subtitle descriptive of the content. May be repeated to 8 units. 4 lectures. Prerequisite: Engl 311, 312 or consent of instructor.

Engl 419 Elizabethan Drama (3)

A survey of the English drama from its beginning to 1642, excluding Shakespeare. 3 lectures. Prerequisite: Engl 204, 221

Engl 461 Senior Project (2)

Selection and completion of a project under faculty supervision. Projects typify problems which a graduate may face in his field of employment. Project results are presented in a formal written report. Minimum 60 hours total time.

Engl 463 Undergraduate Seminar (2)

Study of professional articles and materials, research methodology and bibliography, professional orientation. 2 lectures. Prerequisite: Senior standing.

Engl 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

Engl 501 Introduction to Graduate Study (2)

Introduction to graduate scholarship and research in literature, language and composition. Research methodology and bibliographic techniques. May not be elected where credit for Engl 463 has been earned. 2 lectures. Prerequisite: Graduate status in English.

Engl 502 Introduction to Critical Analysis (3)

Basic approaches used by critics. Multiple points of view; application to literary works; reflection of critical analysis in student compositions. Designed to aid the teacher of secondary English to enrich the courses taught in secondary schools. 3 lectures. Prerequisite: graduate standing.

Engl 503 Contemporary Language Study (3)

Correlation between current development of English language and courses in grammar and composition in public schools. Usage, vocabulary, spelling, idiom, punctuation, grammar, sentence structure. Understanding of effects of language change upon writing and speaking. Suitable for upper grade, junior and senior high school teachers. 3 lectures. Prerequisite: Engl 301 or consent of instructor.

Engl 504 Problems in Language (3)

Study of development of English; consideration of problems of grammar and uses of language. May be repeated to 9 units. 3 lectures. Prerequisite: Engl 503

Engl 505 Problems in Composition (3)

Study of special problems in composition. Direct application of new language information to composition or detailed analysis of relationship between rhetorical principles and writing. May be repeated to 9 units. 3 lectures. Prerequisite: Graduate status in English.

Engl 511 Problems in American Literature (3)

Concentrated study of American authors or periods. Written and oral reports of individual investigation. May be repeated to 9 units. 3 lectures. Prerequisite: Graduate status in English.

Engl 512 Problems in British Literature (3)

Concentrated study of British authors or periods. Written and oral reports of individual investigation. May be repeated to 9 units. 3 lectures. Prerequisite: Graduate standing in English.

Engl 521 Curriculum and Methods in English (3)

Instruction in composition and literature as they may be applied to secondary school teaching. 3 lectures. Prerequisite: Admission to teacher education program or graduate status.

Engl 522 Introduction to Teaching English as a Second Language (3)

Contrastive analysis of native and target language, methods and materials for testing and teaching English to non-native speakers: phonemic analysis, oral-aural drill, pattern practice, structure and grammar, composition, planning of curriculum materials from available resources. 3 lectures.

Engl 590 Graduate Seminar in English (1-3)

Independent or group study of special problems in selected areas of language, composition, or literature. Total credit limited to 3 units. 1-3 lectures. Prerequisite: Graduate status in English.

ENTOMOLOGY

Ent 126 General Entomology (4)

Introduction to the study of insects. Structure, major orders and families of insects, life histories, economic importance and control. Insect collection required. 3 lectures, 1 laboratory.

Ent 227 Insect Morphology (4)

Morphology of exoskeleton, appendages and internal organs; direct applications of principles are emphasized with economically important insects. 2 lectures, 2 laboratories. Prerequisite: Ent 126

Ent 332 Economic Entomology (3)

Identification, life histories and control of insects beneficial or injurious to various crops, fruits, stored products, domestic animals and man; important invertebrates such as mites, ticks and spiders. 1 lecture, 2 laboratories. Prerequisite: Zoo 132 or Bot 122; Ent 126; Chem 226 or consent of instructor.

Ent 421 Immature Stages of Insects (4)

Identification, biology, and economic importance of preimaginal insect forms. 2 lectures, 2 laboratories. Prerequisite: Ent 126, Bio 325

Ent 590 Seminar in Entomology (1)

Problems and topics in advanced entomology selected according to the interest and needs of the students enrolled. Maximum of 3 units. 1 lecture. Prerequisite: Graduate status and evidence of satisfactory preparation in entomology.

ENVIRONMENTAL DESIGN

EDes 101 Introduction to Architecture and Environmental Design (2)

Familiarization with the professional fields of architecture, landscape architecture, structural engineering, construction, and city planning. Introduction to the design process and development as a basis for architectural analysis. 2 lectures.

EDes 110 Descriptive Drawing (1)

Exercises in drawing without mechanical aids. Total credit limited to 3 units, not more than 1 unit in any one quarter. 1 laboratory.

EDes 111 Introduction to Drawing and Perspective (3)

Basic techniques used in graphic communication. Orthographic and isometric projection. Mechanical perspective, shades and shadows. 3 laboratories.

EDes 112 Basic Graphics (3)

Drawing as a communication tool in the Environmental Design fields. Exercises to develop basic skills and speed in the representation of ideas. Use of various drawing media. 3 laboratories. Prerequisite: EDes 111

EDes 113 Graphics (6)

Covers material in EDes 111 and 112. Primarily for transfer students. Partial credit may be granted. 6 laboratories.

EDes 201, 202, 203 Environmental Design Fundamentals (4) (4) (4)

Elements of visual perception. Theories of environmental design. Program development. Analytic techniques and problem solving methodologies. Behavioral and social implications of environmental design decisions. Projects in the environmental context. Field trip required. 1 lecture, 3 laboratories. Prerequisite: EDes 101 or equivalent.

EDes 205 Survey of Environmental Design (3)

Overview of man-altered environments. Buildings, cities and regions. Broad-view for non-architectural majors of man's structures and the role of the environmental designers and developers. Directions of change and improvement. 3 lectures.

EDes 210 Advanced Descriptive Drawing (2)

Advanced programs in descriptive drawing as continuation of EDes 110. 2 laboratories.

EDes 250 Digital Computer Applications (2)

Solution of selected environmental problems by means of digital computers. 2 activities.

EDes 303 Human Factors for Environmental Designers (3)

Integrated approach to development of systematic design programs. Developing and interpreting human factors design criteria, performance and satisfaction as a function of environmental factors, determining and assessing user preferences, methods of field observation and analysis. 3 lectures. Prerequisite: Psy 311 and third year standing in School of Architecture and Environmental Design or permission of instructor.

EDes 463 Undergraduate Seminar (2)

Discussion and lectures on problems of practice in the environmental design field. Professional ethics. Students present organized material on some subject of interest in Architecture, Architectural Engineering, Construction Engineering, City and Regional Planning or Landscape Architecture. 2 activities. Prerequisite: Senior standing in degree major.

ENVIRONMENTAL ENGINEERING

EnvE 101 Introduction to Environmental Engineering (1)

Nature and scope of the field of environmental engineering. Organization of the engineering effort and the responsibilities of the engineer. Interrelationships between technology and society. 1 lecture.

EnvE 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

EnvE 204 Heating and Ventilating (5)

Analysis of heating and ventilating equipment and its application to industrial, commercial and public buildings. 5 lectures. Prerequisite: Chem 121 or 124 and Phys 122 or 132

EnvE 231, 232, 233 Fluid Systems (2)(2)(2)

Materials, equipment, principles, and techniques used in designing and installing environmental fluid flow systems. 1 lecture, 1 laboratory. Prerequisite or concurrent: (231) Phys 122 or 132; (232) Chem 121 or 124

EnvE 237 Boilers and Steam Equipment in Agriculture (2)

The operation and maintenance of steam equipment as applied to the agricultural industry. Course designed for students in Agriculture. 2 lectures.

EnvE 240 Additional Engineering Laboratory (1-2)

Elective project work. Total credit limited to 4 units with not more than 2 units in any quarter. 1 or 2 laboratories.

EnvE 304 Thermodynamics of Processes (3)

Material balances, energy balances, liquids and mixtures, vapor-liquid equilibria, solubility and absorption, equilibrium in chemical reactions. 3 lectures. Prerequisite: ME 302; Chem 126 or permission of instructor.

EnvE 305 Thermodynamics of Refrigeration (4)

Thermodynamic analysis of basic power and refrigeration cycles. Thermodynamic analysis of various vapor compression refrigeration systems and components. Combustion. 4 lectures. Prerequisite: ME 302, Chem 125

Environmental Engineering

EnvE 306 Survey of Heating and Air Conditioning (3)

Basic principles concerning comfort, thermal types of equipment and systems, space requirements and energy sources. Course designed for students not majoring in Environmental Engineering. 3 lectures. Prerequisite: Phys 131

EnvE 309 Noise and Vibration Control (3)

Behavior of sound waves, selection of instrumentation, practical measurements, criteria for noise and vibration control in environmental systems. 3 lectures. Prerequisite: Phys 133, Math 241

EnvE 313 Heat Transfer (3)

Basic principles of heat transfer, radiation, conduction, convection in gases and liquids, boiling and condensing of fluids during forced and gravity flow conditions. 3 lectures. Prerequisite: ME 302 or Chem 305

EnvE 324 Introduction to Air Pollution (3)

Causes and effects of air pollution on the individual, the community and industry. Legal and public relations aspects. For non-majors. 3 lectures. Prerequisite: Junior standing.

EnvE 325 Environmental Air Quality (3)

Consideration of ambient air contamination inside and outside of a control space. Factors included in establishing, monitoring and maintaining air quality standards. 3 lectures. Prerequisite: Chem 125. Concurrent: ME 302

EnvE 326 Air Pollution Measurements (3)

Planning and conduct of atmospheric surveys. Collection, evaluation, and interpretation of data as they pertain to the concentration of pollutants sampled. 2 lectures, 1 laboratory. Prerequisite: Chem 126, EnvE 325

EnvE 327 Water Pollution (3)

Sources of pollution. Water quality standards. Principle techniques and operations applicable to liquid waste disposal systems. Application of theory of mixing, filtration, fluid flow, sedimentation, filtration, and heat transfer to systems design and pollution control. 3 lectures. Prerequisite: Bio 101, Chem 124. Concurrent: Math 141

EnvE 330 Environmental Quality Control (3)

Aspects of the total environment. Application of scientific and engineering principles to control the development and use of air, water and land resources. Control of the pollution of the environment. Disposal of wastes. Administrative and legal aspects. 3 lectures. Prerequisite: Junior standing

EnvE 351 Environmental Engineering Measurements (2)

Experimental studies of the instrumentation and basic measurements of concern to the environmental engineer. Procedures used in the analysis and reporting of experimental data. Corollary concepts of basic physical phenomena. 1 lecture, 1 laboratory. Prerequisite: EnvE 202

EnvE 352, 353 Thermal and Fluids Laboratory (3) (3)

Laboratory tests in controls, thermodynamics, fluid flow, heat transfer, noise, and vibration analog methods. Performance testing of refrigeration systems, evaporators, condensers, fans, air washers, and air distribution devices. 1 lecture, 2 laboratories. Prerequisite: EnvE 351

EnvE 361, 362 System Design (3) (3)

Project work in designing environmental control systems. Air cleaning, ventilation and heating. 3 laboratories. Prerequisite: EnvE 204, ME 302

EnvE 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

EnvE 403 Advanced Mass and Energy Transfer (3)

Psychrometric properties, processes and measurements. Wetted surface heat and mass transfer. Solar and convective periodic loads. 3 lectures. Prerequisite: EnvE 313, ME 341

EnvE 405 Air Conditioning Processes and Systems (4)

Analysis of direct contact processes. Heat exchangers. Analysis and synthesis of air conditioning systems. 4 lectures. Prerequisite: EnvE 403, EnvE 305

EnvE 406 Advanced Fluid Flow (4)

Fluid dynamics and fluid machinery. Centrifugal and axial fans, pumps and compressors. Turbines. Fluid flow in ducts. 4 lectures. Prerequisite: ME 341, EnvE 351

EnvE 411 Air Pollution Control (3)

Theory, principles and practices related to the control of particulate emissions. Mechanical separations. Cost and design of control systems. 3 lectures. Prerequisite: EnvE 326

EnvE 416 Automatic Process Control (2)

Introduction to automatic control instrumentation. Graphical method for analysis of control systems. Analytical determination of control response. 2 lectures. Prerequisite: Math 318, ME 302

EnvE 421 Advanced Air Pollution Control (3)

Theory, principles and practices related to the control of gaseous emissions. Process characteristics. Odor control. Mass transfer operations as applied to environmental control. 3 lectures. Prerequisite: EnvE 411

EnvE 422 Environmental Radiation Surveillance (2)

Sources of radioactive contaminants, biological effects, radiation protection. Environmental sampling and analysis of airborne radiation. Controls and disposal of wastes. 2 lectures. Prerequisite: EnvE 421

EnvE 423 Industrial Environments (2)

Effects of the environment in relation to health and the performance of work. Adverse and favorable temperatures and pressures, atmospheric impurities, toxicants. Control of occupational hazards and disease. 2 lectures. Prerequisite: EnvE 421

EnvE 428 Meteorology (3)

Weather instruments; insolation, convection and advection; land and sea breezes; fog, smogs, clouds, and showers; thunderstorms; lapse rate and temperature inversions; cyclones; anti-cyclones; tornadoes and waterspouts; stacks and plumes; meteorological conditions under which air pollution accumulates. 2 lectures, 1 laboratory. Prerequisite: Phys 122 or 132

EnvE 429 Waste Treatment and Disposal (4)

Properties and characteristics of domestic and industrial liquid wastes. Systems and processes used in treatment. Effluent quality and relation to water pollution control. Methods of solid waste disposal; sampling and analysis techniques; chemical and physical changes. Cost considerations. Site visits. 3 lectures, 1 laboratory. Prerequisite or concurrent: EnvE 327

EnvE 434 Water Pollution Measurements (2)

Methods employed in the qualitative and quantitative determinations of water and waste water constituents. Physical, chemical and biological procedures used in determining water quality. Testing of effluents from industrial and municipal treatment plants. 1 lecture, 1 laboratory. Prerequisite: Chem 226, 331

Ethnic Studies/Farm Management

EnvE 436 Water and Waste Water Treatment (5)

Unit operations and unit processes encountered in water and waste water treatment. Principles of screening, mixing and agitation, sedimentation, filtration, heat and mass transfer. Chemical and biological processes used in water treatment for municipal and industrial uses. Treatment of municipal and industrial wastes. Applications to equipment and process design. 5 lectures. Prerequisite: Bact 221, Chem 306, ME 341, EnvE 434

EnvE 437 Solid Waste Management (3)

Preparation of refuse for collection, collection costs, methods and equipment, special refuse problems, disposal and treatment methods. Chemical and physical changes in composting. Leaching methods. Processing of solid wastes. Interrelationships with water quality. 3 lectures. Prerequisite: EnvE 436

EnvE 441, 442, 443 Advanced System Design (3) (3) (3)

Individual and team project work in designing systems for air conditioning. 1 lecture, 2 laboratories. Prerequisite: EnvE 313, 341, ME 341

EnvE 461, 462 Senior Project (2)(2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum of 120 hours total time.

EnvE 463 Undergraduate Seminar (2)

Special studies and technical developments in the field. Individual reports on important research in the environmental engineering field. 2 lectures.

EnvE 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

ETHNIC STUDIES

Eth S 105 Introduction to Ethnic Studies (1)

Introduction to the contributions of academic disciplines to the study of ethnic groups. The role of ethnic studies in establishing communication and mutual understanding between ethnic groups and the entire community. 1 lecture.

Eth S 114 Racism in American Culture (3)

Survey and analysis of racism in the development of American institutions and its effects upon minority ethnic groups and society. 3 lectures.

FARM MANAGEMENT

FM 101 Introduction to Agricultural Economics (5)

Modern economic system, history of U.S. Agriculture, agriculture's role in the economy, prices of agricultural products, marketing agricultural products, agricultural credit and finance, agricultural resources and land use, the role of farm management, introduction to farm management analysis processes, agriculture and the government. May not be substituted for Ec 211, 212 or FM 305. 4 lectures, 1 2-hour laboratory. To be taken by technical students.

FM 102 Farm Records and Management (4)

Farm recordkeeping for income tax purposes and study of farm business, measures of farm profits, factors affecting farm profits, reorganization of an actual farm. May not be substituted for FM 321 or 322. 3 lectures, 1 2-hour laboratory. To be taken by technical students.

FM 103 Farm Management Problems (5)

Crop and livestock enterprise costing, equipment costing and efficiency, determination of most profitable crop combinations, most profitable application of inputs, labor management, government price programs. May not be substituted for FM 421, 424, 425, or 426. 3 lectures, 2 2-hour laboratories. Prerequisite: FM 102. To be taken by technical students.

FM 124 Agriculture (3)

Identification and use of major crops and livestock, types of farming in the United States, the place and function of the farm marketing system, broad classes of soil and their general management problems, the farm problem as it affects farmers and citizens, identification of plants for the home and their general care. 2 lectures, 1 2-hour laboratory. For nonagriculture majors only.

FM 213 Agricultural Economic Analysis (3)

Role of price in the economy, the firm as a decision-making unit, the production function, single input-output analysis, substitution relationships, products combinations, risk analysis, consumption and market demand influence, population and technological changes. 3 lectures. Prerequisite: AM 212

FM 300 Successful California Farms (1)

Visits to successful California farms involving many types of farming. Study of farm resources and organization, techniques of operation, yields, problems. Different regions visited on different trips. Maximum credit is 3 units for three different trips.

FM 305 Agricultural Resources (3)

Survey of agricultural production areas of United States from standpoint of physical resource, markets, economic advantages, and problems. Appraisal of area problem from standpoint of land economic principles. 3 lectures. Prerequisite: Ec 201 or 211

FM 307 World Agricultural Resources (3)

World agricultural production areas with emphasis on natural and human resources, existing production, economic implications, population growth and potential food supply. 3 lectures. Prerequisite: Ec 201 or 211

FM 315 Land Economics (3)

Supply of land, population pressure on land, input-output relations affecting land use, economic returns, land values, development and investment costs, locational factors, conservation, institutional factors, leasing, land use planning, taxation, public regulations. 3 lectures. Prerequisite: Ec 201 or 211

FM 321 Farm Records (4)

Fundamentals of record keeping, kinds of records, inventory, depreciation, cash and accrued basis of income tax reporting, balance sheet, operating statement, analysis of statements. 3 lectures, 1 2-hour laboratory. Prerequisite: Ec 201 or 211

FM 322 Principles of Farm Management (4)

The role of farm management, types of farming, problems of leasing and buying a farm, labor problems, measures of profits, factors affecting profits, budgeting of laboratory farms, independent analysis of farm for term report. 3 lectures, 1 2-hour laboratory. Prerequisite: FM 321 or Actg 131 and 132

FM 325 California Agriculture (3)

Agricultural regions of California considered from standpoint of physical resources, crops and livestock, size, tenure, water problems, relation to urban areas, land development. 2 lectures, 1 2-hour laboratory. Prerequisite: Ec 201 or 211

FM 326 Farm Appraisal (4)

Methods of farm appraisal, use of county records, appraisal practice on different types of farms, discussions with professional appraisers. 3 lectures, 1 2-hour laboratory. Prerequisite: Ec 211 and junior standing

Farm Management

FM 333 Agricultural Price Analysis (3)

Application of statistical tools for price analysis. Emphasis on price making process for specific agricultural commodities. Utilization of market reports and production estimate data in price forecasting and analysis. 2 lectures, 1 2-hour laboratory. Prerequisite: Stat 212 and AM 250

FM 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

FM 403 Agricultural Prices and Policy (3)

Price making process, price variation and trends, governmental price control programs, price characteristics and problems of specific agricultural commodities. 3 lectures. Prerequisite: Ec 201 or 211

FM 405 Linear Programming in Agriculture (3)

Application of linear programming to modern commercial agriculture; assumptions and data requirements; graphic and simplex solutions; modification of basic assumptions to avoid program restrictions; price and resource mapping; preparation, coding and solutions of models simulating current problems. 2 lectures, 1 2-hour laboratory. Prerequisite: AM 250

FM 406 Advanced Agricultural Economic Analysis (3)

Basic mathematical concepts; marginal analysis; maximization, minimization and basic differential calculus, decision and game theory as it pertains to the agricultural firm. 3 lectures. Prerequisite: FM 213, Math 212

FM 421 Crop Management Problems (3)

Crop enterprise costing procedure, analysis of rotation systems, labor problems, irrigation plans, determination of most profitable rates of fertilization and irrigation, marketing crops, land development costs, effect of shifting cropping plan. 3 lectures. Prerequisite: FM 322

FM 424 Poultry Husbandry Management Problems (3)

Poultry enterprise costing procedure, economics of plant layout, analysis of labor saving equipment and procedure, determination of most profitable feed combination, credit for poultrymen, use of outlook reports, marketing methods. 3 lectures. Prerequisite: FM 322

FM 425 Livestock Management Problems (3)

Costing procedure for animal enterprises, types of beef operations compared, feed lot management problems, determination of most profitable feed rations, livestock marketing procedure, effect of feed resource changes on organization and profits. 3 lectures. Prerequisite: FM 322

FM 426 Dairy Management Problems (3)

Dairy enterprise costing procedure, relation of cropping plan to dairy organization, analysis of feed resource costs, determination of most profitable feed rations, costs and problems of shifting from grade B to grade A dairy, most profitable culling. 3 lectures. Prerequisite: FM 322

FM 430 Orientation to California Agriculture (6)

Study of California agriculture through visitation to major production areas of the State. Problems in connection with organization, management, production practices, marketing procedures, use of equipment, soils, climate, and irrigation are considered. Offered in summer only. Open only to agricultural majors. Prerequisite: Senior standing or permission of Dean of Agriculture and Natural Resources.

FM 431 Large Farm Accounting (3)

Application of commercial accounting process to large farm accounting problems. Special emphasis will be given to the problem of devising and executing an accounting system that will give necessary details on specific enterprises for analysis and control. 2 lectures, 1 2-hour laboratory. Prerequisite: Actg 131, 132

FM 461, 462 Senior Project (2) (2)

Analysis of a farm management problem selected by student with approval of adviser. Project results are presented in a formal report. Minimum 120 hours total time.

FM 463 Undergraduate Seminar (2)

Student presentation and description of developments and problems in farm management. 2 lectures.

FM 520 World Agricultural Development (3)

Special problems of agricultural development in selected emerging nations; considering the role of government policies in directing development. 3 lectures. Prerequisite: FM 307

FM 581 Graduate Seminar in Farm Management (3)

Group study of current problems; development and analysis methods in the field. Consideration given to the place of Farm Management in the teaching of vocational agriculture. 3 lectures.

FINANCE AND PROPERTY MANAGEMENT

FPM 201 Survey of Securities Investments (3)

Security types available for investment, sources of investment information, operation of security markets. Basic types of approach to investment determination, fundamental and technical approaches. 3 lectures.

FPM 310 Insurance Principles (4)

Basic principles of insurance and insurance buying from the viewpoint of the consumer. Major types of insurance coverage—life, health, property, and casualty—and the underlying economic problems each is designed to solve. 4 lectures. Prerequisite: Bus 201 or 207

FPM 330 Real Estate Principles (4)

Introduction to the field of real estate providing a basic background for further study. Includes legal aspects, financing, valuation, economics, public control, title insurance and escrow, closing, safe-guards for the buyer of real estate, investment, and leasing. 4 lectures. Prerequisite: Bus 201 or 207

FPM 331 Real Estate Practice (4)

Practical aspects of the real estate business: licensing, office management, selling, contracts and leases, advertising and public relations, financing, escrow, taxation, insurance, business opportunities, property management, exchanging, syndication and investment. 4 lectures. Prerequisite: FPM 330

FPM 332 Real Estate Finance (4)

Analysis of the relationship between national and local money markets. Real estate financing techniques, sources of funds, government participation, legal instruments of finance. 4 lectures. Prerequisite: FPM 330

FPM 333 Real Estate Appraisal (4)

Cost, market, and income approaches to valuation. Appraisal process for urban residential and investment properties. 4 lectures. Prerequisite: FPM 330

FPM 334 Real Estate Investment (4)

Effects of federal, state and local taxes on investment transactions. Intensive investigation and computer analysis of urban investment opportunities. Problems in exchanging and property management. 4 lectures. Prerequisite: FPM 330, FPM 332 and/or 333 recommended.

FPM 342 Financial Management (4)

Problems of financing current and fixed assets from internal and external sources. Emphasis on analysis, planning and control. 4 lectures. Prerequisite: Stat 212, Actg 301

Food Industries

FPM 411 Security Analysis and Portfolio Management (4)

Analysis of securities, markets, and valuation. Security price movements related to money and capital market factors and corporate events. Portfolio planning, risk, media, and objectives of individual and institutional investors. 3 lectures, 1 two-hour laboratory. Prerequisite: Ec 337, FPM 342, Stat 212

FPM 412 Law of Real Property (4)

Legal problems of acquisition, ownership and transfer of real property. Taxes, homestead, community property, landlord and tenant relationships, easements and zoning. 4 lectures. Prerequisite: Bus 201 or 207

FOOD INDUSTRIES

FI 101 Survey of Food Industry (2)

Introductory course including size, distribution, major production areas of the food processing industry. 2 lectures.

FI 122 Introductory Food Engineering (3)

Physical properties of water and steam and their usage. Introduction to unit operations such as washing, peeling and cutting. 2 lectures, 1 laboratory.

FI 123 Elements of Food Preservation (3)

Principles of food preservation including canning, freezing, dehydration and fermentation. 2 lectures, 1 laboratory.

FI 200 Special Problems for Undergraduates (1-2)

Individual investigation, research studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

FI 209 Meat Procurement and Use (3)

Selection, identification and cutting of meat. Physical and chemical composition of meat and its relationship to flavor, tenderness, and nutritional value. 2 lectures, 1 laboratory.

FI 210 Meats (3)

Practice in slaughtering and processing of beef cattle, sheep and hogs. A study of carcass grades, yield, and cut out value. Meat curing methods, by-products and consumption trends. 2 lectures, 1 laboratory.

FI 212 Meat Classification and Grading (2)

A comprehensive and detailed study of those factors related to carcass quality, conformation, and finish, to include meat classification, grading and judging of carcass and wholesale cuts of beef, pork, and lamb. Field trip to meat packing plants is required. 1 lecture, 1 laboratory. Prerequisite: FI 210

FI 221, 222, 223 Unit Processing Operations (3) (3) (3)

Lecture and laboratory study of complete processing procedures for seasonal fruits and vegetables, specialties and other processed food. 2 lectures, 1 laboratory. FI 224 offered in summer only. Prerequisite: FI 123 or 230

FI 230 Elements of Food Processing (4)

Principles of unit operations in food processing covering canning, freezing, dehydration, concentration and fermentation. Food quality and spoilage. For majors other than Food Processing majors. 3 lectures, 1 laboratory.

FI 233 Processed Food Inspection (3)

Fundamentals, principles and procedures for inspecting processed foods based upon federal and state grades. Laboratory work in grading various products. 2 lectures, 1 laboratory.

FI 321 Food Plant Quality Control (3)

Methods of organizing and operating food and plant quality control systems including chemical and physical techniques. 2 lectures, 1 laboratory. Prerequisite: FI 221 or 233

FI 331 Sanitation and Waste Disposal (3)

The organization, management and operation of a food plant sanitation and waste disposal program. 2 lectures, 1 laboratory. Prerequisite: Chem 226, Bact 221

FI 332 Statistical Quality Control (3)

The application of statistical methods in quality control programs and evaluation of operations. 2 lectures, 1 laboratory. Prerequisite: FI 221, 222, or 223

FI 336 Packaging (3)

Study of packaging materials, packages and packaging methods applicable to a variety of processed foods. 2 lectures, 1 laboratory.

FI 338 Sausage, Smoked and Canned Meats (3)

The manufacturing of processed meats. Product formulation, curing, smoke house operation, meat canning, sanitation and quality control. 2 lectures, 1 laboratory. Prerequisite: FI 309, 210 or 212

FI 341 Wines and Fermented Foods (3)

Methods of production and testing of fermented foods. 2 lectures, 1 laboratory. Prerequisite: Junior standing and consent of instructor.

FI 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

FI 421, 422 Advanced Food Processing (3) (3)

Detailed study of more involved processing operations and the physical and chemical actions of the processes. Basic properties of carbohydrates, proteins and lipids in relation to products and processes. 2 lectures, 1 laboratory.

FI 425 Food Evaluation (3)

Characteristics of food color, consistency, texture and flavor. Sensory evaluation and grading. Food acceptance testing. Statistical analysis of data. 2 lectures, 1 laboratory.

FI 431 Meat Technology (3)

Characteristics of meat and meat products as related to processing and marketing with special emphasis on problems and variations encountered during these operations. 2 lectures, 1 laboratory. Prerequisite: Junior standing and permission of instructor.

FI 433 Food Processing Management (3)

Plant equipment construction, plant layout and flow lines, cost estimating, work simplification, automation and control systems. 2 lectures, 1 laboratory. Prerequisite: Junior standing and instructor's permission.

FI 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

FI 463 Undergraduate Seminar (2)

Major developments in the chosen field of the student. Discussion of new developments, policies, practices, and procedures. Each individual is responsible for the development and presentation of a topic in his chosen field. 2 lectures.

Foreign Language/French/Fruit Science

FI 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

FI 551 Food Constituents and Characteristics (4)

Graduate level study of chemical and physical properties of proteins, carbohydrates, lipids, pigments, enzymes and additives related to formulation and processing of food. 3 lectures, 1 laboratory. Prerequisite: Graduate standing and permission of instructor.

FI 581 Graduate Seminar in Food Processing (3)

Current findings and research problems in the field and their application to the industry. 3 lectures.

FOREIGN LANGUAGE

ForL 101, 102, 103 Foreign Language, Independent Study (3) (3) (3)

Independent supervised study arranged for students who wish individually to acquire basic skill in a foreign language. Instruction includes use of prerecorded and programmed materials. Not open for credit by examination.

ForL 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

FRENCH

Fr 101, 102, 103 Elementary French (4) (4) (4)

For beginners. Class practice in pronunciation, sentence structure, reading, writing, and basic conversation. Laboratory drill with recorded materials. 3 lectures, 1 two-hour laboratory.

Fr 201, 202, 203 Intermediate French (3) (3) (3)

Further practice in speaking, reading, and writing French. Introduction to French culture. 3 lectures. Prerequisite: Fr 103 or equivalent.

Fr 301, 302, 303 Third Year French (3) (3) (3)

Readings in French literature; poetry, essays, novels, plays. 3 lectures. Prerequisite: Fr 203 or equivalent.

FRUIT SCIENCE

FrSc 123 Beekeeping (3)

Practical studies and exercises in the handling of honey bees with special reference to pollination of commercial crops. Honey processing and marketing. Bee inspection and disease detection. 2 lectures, 1 laboratory.

FrSc 131 Pomology (4)

History and outlook for California fruit growing. Apple, peach, pear and prune production practices. Field laboratories in orchard management practices, tree and fruit identification, harvesting, grading and packaging of college orchard products. 3 lectures, 1 laboratory. Credit will not be allowed for both FrSc 131 and 230.

FrSc 132 Pomology (4)

Planting and planning the deciduous orchard. Apricot, cherry, fig, olive and plum production practices with special emphasis on pruning trees and grapevines. 3 lectures, 1 laboratory. Prerequisite: FrSc 131

FrSc 133 Pomology (4)

Production practices common to deciduous nut crops produced in California. Normal spring cultural problems including thinning and spraying. Small fruit culture. 3 lectures, 1 laboratory. Prerequisite: FrSc 132

FrSc 230 California Fruit Growing (4)

Production practices, areas of production, suitable varieties, harvest and processing of important deciduous and subtropical fruit crops. Methods of propagation and training. 3 lectures, 1 laboratory. Credit will not be allowed for both FrSc 131 and FrSc 230

FrSc 231 Viticulture (4)

A comprehensive study of grape growing utilizing the college plantings for field practice in planting, training and maintaining the vineyard. Varietal identification and use. 3 lectures, 1 laboratory.

FrSc 232 Fruit Plant Propagation (4)

Propagation by seed, cuttings, layering, grafting, and budding. Rootstocks for deciduous fruits, commercial nursery practices. 3 lectures, 1 laboratory. Prerequisite: FrSc 133 or 230

FrSc 324 Tropical Fruit and Nut Production (4)

Common practices in producing tree and fruit crops of economic importance in tropical areas—cocoa, tea, coffee, pineapple, oil palm, bananas, dates and papaya. 3 lectures, 1 laboratory.

FrSc 331 Advanced Viticulture (4)

Commercial production practices, mechanization and processing. Management of college planting. Field labor management efficiency studies. Techniques in handling and harvesting. 3 lectures, 1 laboratory. Prerequisite: FrSc 231

FrSc 332 Citrus and Avocado Fruit Production (4)

Growing and marketing oranges, lemons, grapefruit, avocados and dates. Minor subtropical fruits also included. Orchard practice. 3 lectures, 1 laboratory.



FrSc 421 Advanced Pomology (3)

Storage problems, post-harvest physiology, environmental factors affecting fruit development. Maturity standards. Two-day field trip required. 2 lectures, 1 laboratory. Prerequisite: FrSc 131 or 230

FrSc 436 Orchard Management (4)

Organization and management of labor and equipment in field and processing operations. Production problem analysis. Advanced work in production management. Job instruction training. 3 lectures, 1 laboratory. Prerequisite: FrSc 421

Geography/Geology

FrSc 521 Advanced Fruit and Nut Crop Production (4)

Advanced commercial production and management techniques. Use of mechanical aids and harvesters as related to size of crops, harvesting, and post-harvest handling. 3 lectures, 1 laboratory. Prerequisite: Permission of instructor.

FrSc 581 Graduate Seminar in Fruit Production (3)

Group study of current problems of fruit production; current experimental and research findings as applied to production and marketing. 3 lectures.

GEOGRAPHY

Geog 150 Human Geography (4)

Introduction to the concepts, techniques, and tools in geography. Survey of the field of geography with attention focused on man's adaptation to his environment and his role in changing the face of the earth. Laboratory period includes field trips, map making and interpretation, and elementary data analysis. 4 lectures.

Geog 250 Physical Geography (4)

Distribution and interrelationships of the earth's physical phenomena. Landforms, weather and climate, vegetation and soils. Field trips, atlas work, weather, and topographic maps. 4 lectures.

Geog 305 Political Geography (3)

Spatial influences on man's political behavior. Geopolitics, boundaries, significance of resources on power politics, internal spatial structure of the nation-state, relationships between nation-states. 3 lectures. Prerequisite: Pol Sc 201 or equivalent.

Geog 308 Global Geography (3)

Survey of man's utilization and occupation of the earth. Interrelations of human life and elements of natural dependence of nations, and world trade. Supporting power of geographical environment. 3 lectures.

Geog 310 Urban Geography (3)

Presentation of geographic concepts, principles, and generalizations related to urban functions, forms, distribution, and growth. Location, areal extent, and interaction among the various urban functions. 3 lectures.

Geog 315 Economic Geography (3)

Man's utilization of the natural environment. Spatial aspects of production, distribution, and consumption of commodities from the earth. 3 lectures. Prerequisite: Ec 201 or equivalent.

Geog 401 Area Geography (3)

Depth study of geographic characteristics of a selected world area. Each time the course is offered it will bear a subtitle descriptive of the particular world area studied. 3 lectures. May be repeated to a total of 12 units. Prerequisite: One course in Geography.

GEOLOGY

Geol 201 Physical Geology (3)

Processes responsible for the earth's present characteristics. Mountain building, metamorphism, igneous activity, depositional agencies, sedimentation. Examples from local area. Topographical and geological maps. Rocks and minerals. 3 lectures.

Geol 202 Historical Geology (3)

Principles of historical interpretation of rocks and earth structures. Age of the earth and dating methods. Origin of the gross structure of the earth. Geologic evolution of North America in terms of changing landscapes, climates, and tectonic patterns. 3 lectures. Prerequisite recommended: Geol 201

Geol 204 Geologic History of California (3)

Development of California through geologic time. Where and why the rocks appeared. Movement on faults, and mountain building. Geologic processes at work today and yesterday. Relationship of California geology to the rest of the world. 3 lectures.

Geol 205 Earthquakes and Earth Hazards (3)

Man and his interaction with the geologic environment. Problems of earthquakes, landslides, floods, land subsidence, volcanic activity and other geological related disasters. Disaster prevention. Includes field trip to observe local geological problems. 3 lectures.

Geol 241 Physical Geology Laboratory (1)

Properties, identification, and origin of earth materials. Interpretation of topographic maps, aerial photos, geologic maps, scale models, and field observations in terms of the effect of geologic processes on the earth's surface, internal structure, and man's use of the earth. 1 laboratory. Prerequisite or concurrent: Geol 201

Geol 321 Marine Geology (4)

Techniques of ocean floor exploration, nearshore sedimentary processes and shoreline evolution, continental margin sediments and geologic history, ocean floor topography and sediments, origin and evolution of ocean basins, physical resources of the ocean. 3 lectures, 1 activity. Prerequisite: Geol 201 or consent of instructor.

GERMAN

Ger 101, 102, 103 Elementary German (4) (4) (4)

For beginners. Class practice in pronunciation, sentence structure, reading, writing and basic conversation. Laboratory drill with recorded materials. 3 lectures, 1 two-hour laboratory.

Ger 301, 302 Scientific German (4) (4)

Short, intensive grammar. Emphasis on reading of scientific German materials and texts. Translation projects in the field of student's choice. 3 lectures, 1 activity.

GRAPHIC COMMUNICATIONS

GrC 101 Introduction to Graphic Communication (2)

Orientation to the Graphic Communications program. Examination of the industry, its traditions, technological changes, and employment opportunities. 2 lectures.

GrC 102 Proofreading (2)

Copy editor's and proofreader's marks, spelling, punctuation, division of words, compounding, and style. Methodical approach to proofreading. 2 lectures.

GrC 104 Graphics (3)

Principles of design and display. Type classifications, copy preparation, copy fitting, influence of art on typography, and the effect printing processes have on the selection of type. 3 lectures.

GrC 111 Substrates and Ink (3)

Manufacturing processes. Testing, procurement, pricing, classifications, appropriateness to end product. 2 lectures, 1 activity.

GrC 122 Typography (5)

Fundamentals of design with type. The point system, type identification, proofreading, copy markup systems. Introduction to commercial and newspaper composition. 3 lectures, 2 laboratories. Prerequisite: GrC 104 or consent of instructor.

Graphic Communications

GrC 123 Binding and Finishing (3)

Effective imposition techniques. Cutting, folding, assembling of folded material, finishing operations. Case and perfect bookbinding. 2 lectures, 1 laboratory.

GrC 126 Image Carriers (2)

Characteristics of image carriers for offset, letterpress, gravure. Production methods. 1 lecture, 1 activity.

GrC 127 Graphic Arts Processes (3)

Introduction to the graphic arts. Printing processes, design, layout, composition, presswork, cold type, binding, silk screen, offset, photography, and duplicating processes. For non-majors. 1 lecture, 2 laboratories.

GrC 132 Letterpress (2)

Operation and maintenance of platen and cylinder presses. Introduction to imposition, lock-up, makeready, registration, ink control. Analysis of rollers, ink and paper. 1 lecture, 1 laboratory.

GrC 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

GrC 204 Introduction to Printing Management (2)

Structure of the industry, levels of management, management of printing processes and plant safety. 2 lectures.

GrC 223 Copy Preparation (3)

Preparation of line and tone copy for the reproduction processes. Designing roughs and visuals and preparation of single and multi-color mechanicals. Production planning. 2 lectures, 1 laboratory.

GrC 224 Composing Machines (5)

Keyboard operation of linecasting machines. Newspaper, bookwork, magazine, and commercial composition. Operating adjustments, maintenance and repair of linecasting machines. 2 lectures, 3 activities. Prerequisite: GrC 122

GrC 227 Process Camera (3)

Characteristics of photographic materials and equipment for the graphic arts. Theory and practice in the use of process cameras. Densitometry. Sensitometry. Applications of special purpose screens. 1 lecture, 2 laboratories. Prerequisite: Sophomore standing or consent of instructor.

GrC 228 Stripping and Platemaking (2)

Planning for lithographic press plates. Ruling, scribing, opaquing, and retouching negatives. Preparation of supports for stripping. Layout and assembly of stripped flats. Proofing techniques. 1 lecture, 1 laboratory. Prerequisite: GrC 227

GrC 229 Lithography (3)

Theory and practice in the use of single-color sheet-fed offset presses. Sheet feeders, printing units, inking units, dampening units and deliveries. Characteristics of papers and inks for offset lithography. 1 lecture, 2 laboratories. Prerequisite: GrC 228

GrC 233 Letterpress (3)

Characteristics and operation of automatic letterpresses. Techniques and procedures for ink mixing and color matching. Advanced study of makeready systems. Ink and paper relationships. 1 lecture, 2 laboratories. Prerequisite: GrC 132

GrC 238 Advanced Graphic Arts (3)

Advanced study and related applications of design, layout, composition, press work and bindery. For non-majors. 3 activities. Prerequisite: GrC 127

GrC 301 Automated Typesetting (5)

Metallic and non-metallic composition for display and text types. First and second generation phototypesetting machines. Computerized photocomposition systems. 3 lectures, 2 laboratories. Prerequisite: GrC 224

GrC 303 Estimating (3)

Estimating commercial printing produced by the major processes. Use of standard price catalogs. Analysis of material, labor, and machine cost factors. 3 lectures. Prerequisite: GrC 111

GrC 304 Theory of Color (2)

Light and color theory. Understanding of the physical, chemical, and psychological concepts of color. Relationship of color to temperature. Color systems. Application of color theory to full-color printing. 2 lectures. Prerequisite: GrC 104

GrC 307 Purchasing (2)

Procurement procedures for printing equipment, raw materials, trade services. Trade customs and practices concerning quantity buying, discounts, leasing and insurance. 2 lectures.

GrC 312 Theory of Lithography (3)

The lithographic process in relation to pH and water controls. Surface plates to deep etch. Film emulsions, reducers and intensifiers. Paper tests and ink reactions. 3 lectures.

GrC 323 Pre-Separated Art for Camera (3)

Manual preparation and separation of line and continuous tone images for multi-color reproduction. Preparation of complex full-color mechanical layouts. 1 lecture, 2 activities. Prerequisite: GrC 223



GrC 326 Printing Equipment Maintenance (3)

Maintenance practices and procedures for all types of printing plant equipment. Designing and administering maintenance systems for various types of plants. 1 lecture, 2 activities. Prerequisite: GrC 224

GrC 329 Reproduction Engineering (3)

Orientation to high-speed, short-run reproduction. Microfilming, blueprinting, xerography. Direct image masters. Programmed duplicators. Specialized finishing operations. Coordination of rapid printing in captive and specialty printing plants. 2 lectures, 1 activity. Prerequisite: GrC 229

Graphic Communications

GrC 332 Publication Systems (3)

Modern production systems used by newspaper and magazine publishers. Production procedures. 2 lectures, 1 laboratory. Prerequisite: GrC 122

GrC 333 Plant Organization and Layout (3)

Printing plant design and layout. Production analysis, work flow patterns, and utilization of space. Organization of plant services. 2 lectures, 1 activity.

GrC 334 Commercial Typography (3)

Design and composition for commercial printing. Corporate stationery, business forms, annual reports, folders, book, and direct mail pieces. Analysis of process limitations. 1 lecture, 2 activities. Prerequisite: GrC 122, 223

GrC 335 Commercial Illustration (3)

Preparation and evaluation of original art copy for commercial use. Laboratory problems in drawing, layout, lettering for single and multiple color runs. Study of various approaches to registration; uses of color and texture in art copy. 1 lecture, 2 activity periods.

GrC 336 Advanced Letterpress (3)

One and two revolution flat bed and rotary letterpresses. Two color presses. Specialty presses. Die-cutting, embossing, die-stamping, and foil printing. Three and four-color process printing. 1 lecture, 2 laboratories. Prerequisite: GrC 132

GrC 338 Survey of Lithography I (3)

Camera copy preparation for offset. Basic line and half-tone photography. For non-majors. 2 lectures, 1 laboratory. Prerequisite: GrC 104 or 127, or consent of instructor.

GrC 339 Survey of Lithography II (3)

Introduction to stripping methods. Preparation of paper and presensitized plates for offset printing. Offset presswork procedures. For non-majors. 2 lectures, 1 laboratory. Prerequisite: GrC 104 or 127, 338 or consent of instructor.

GrC 341 Tape Perforation (2)

Standard and multiface tape perforators, transmitting equipment, reperforating and composing machine keyboard operating units. Operation of Teletypesetter tape perforating units. 2 activities. Prerequisite: Bus 141 or demonstrated typing proficiency.

GrC 357 Screen Processes (3)

Screen process reproduction methods with applications to industry and communications. Includes paper, tusche, knife-cut and photographic stencils. Printing mediums, surfaces, and industrial applications such as printed circuits and packaging. 3 activities. Prerequisite: GrC 104, 127 or consent of instructor.

GrC 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

GrC 401 Printing Sales (2)

Sales management, salesmanship, sales forecasting techniques, and promotion of printed products. Servicing printing accounts. 2 lectures. Prerequisite: Senior or advanced junior standing.

GrC 408 Newspaper Production Management (2)

Sequential analysis of newspaper production processes. Organization of the production function. Personnel and industrial problems peculiar to the industry. 2 lectures. Prerequisite: GrC 204

GrC 411 Estimating and Pricing (3)

Development of an estimating system. Establishment of unit costs and operational time requirements. Analysis of process limitations, time standards, production coordination, service, subcontracting, overhead and profit. 3 lectures. Prerequisite: GrC 303

GrC 416 Web Printing (3)

Theory and practice in the use of web presses for letterpress, offset, rotogravure, and flexographic printing. Applications for packaging, business forms, magazines, books, catalogs and advertising materials. 2 lectures, 1 laboratory. Prerequisite: GrC 229

GrC 421 Printing Management (3)

Principles and applications of printing production forecasting. Functions of printing production control including orders, planning, scheduling, and dispatching. Printing production records. 2 lectures, 1 activity. Prerequisite: GrC 204

GrC 422 Printing Management (3)

Establishment of inspection standards for the printing industry. The appropriateness of judgment and measurement inspection. Instruments for quality control in the printing industry. 2 lectures, 1 activity. Prerequisite: GrC 421

GrC 423 Printing Management (3)

Organization and coordination of sales production, pricing and administrative aspects of printing operations. Industrial relations relative to commercial printing and publishing. 3 lectures. Prerequisite: GrC 422

GrC 429 Photo Composition Systems (3)

Non-metallic composition for display and text types. CRT composition, character generation, pagination, character control, and computer utilization. 2 lectures, 1 laboratory. Prerequisite: CSc 455 or GrC 301 and permission of instructor.

GrC 434 Color Separation (3)

Equipment, materials, and techniques for color separation photography. Three and four color separations from opaque and transparent copy. Introduction to retouching, dot etching and color etching. 1 lecture, 2 laboratories. Prerequisite: GrC 201, 227

GrC 435 Advanced Lithography (3)

Single and multi-color sheet-fed offset presses. Process color printing and precision control of inking and dampening. Practice in quality control. 1 lecture, 2 laboratories. Prerequisite: GrC 229

GrC 437 Package and Container Production (3)

Analysis of the packaging industry with emphasis on reproduction processes, inks, materials (paper, plastics, glass and metals) and finishing operations such as die cutting, waxing, gluing, laminating and sealing. Standards of quality and uniformity as well as troubleshooting. 2 lectures, 1 laboratory.

GrC 441 Applied Printing Technology (3)

Practice in production of offset and letterpress printing. Planning, typesetting, copy preparation, camera, preparation of press forms and plates, presswork, binding and finishing. 3 laboratories. Prerequisite: Senior or advanced junior standing.

GrC 459 Graphic Communication Developments (3)

Developments and trends in processes, methods, materials and equipment used in graphic communication. 3 activities. Prerequisite: Senior standing or consent of instructor.

GrC 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in formal report. Minimum 120 hours total time. Prerequisite: Senior standing.

GrC 463 Undergraduate Seminar (2)

Preparation, oral presentation, and discussion by students of technical papers on recent developments in the industry and senior project material. Each student is required to conduct the seminar class, under supervision of instructor, at least twice during the quarter. 2 lectures. Prerequisite: Senior standing.

History

GrC 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

GrC 521 Curriculum and Methods in the Graphic Arts (3)

Objectives, content, organization, scope, and evaluation of the graphic arts curriculum in secondary schools. Teaching procedures and methods of student evaluation. 3 lectures. Prerequisite: Admission to teacher education program.

HISTORY

Hist 101, 102 History of Civilization (5) (5)

Development of civilization from earliest times to the present. Political, economic, social, intellectual, and religious contributions of the various peoples to contemporary life. 5 lectures.

Hist 112 History of California (3)

Development of California; early explorations, colonization; institutions, government, and economy from beginning to the present; development of culture, industry, agriculture, government, and population. 3 lectures.

Hist 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

Hist 201, 202 United States History (4) (4)

A comprehensive survey of the development of the United States from the 15th century to the present. Hist 201 satisfies the general education requirement of Hist 204 for Social Science and History majors. 4 lectures.

Hist 204 Growth of American Democracy (3)

The historic backgrounds of present-day economic, political, and social problems. Development of American institutions and ideals. Not open to students with credit in or enrolled in Hist 202. 3 lectures. Prerequisite: Pol Sc 201

Hist 205 The United States in World Affairs (3)

The origin, nature, and implementation of U. S. foreign policy since the Second World War. Domestic and international factors relating to U. S. objectives; discussion and analysis of major issues and problems of contemporary U. S. foreign policy. 3 lectures. Prerequisite: Pol Sc 201, History 202 or 204

Hist 206 American Democracy and World Affairs (5)

Combines Hist 204 and 205. Historical significance of American institutions and ideals and the increasing involvement of the United States in world affairs. Not open to students with credit in or enrolled in Hist 202, 204, or 205. 5 lectures. Prerequisite: Pol Sc 201 or equivalent.

Hist 301 European Historiography (3)

Critical studies in historical sources and methods, with examples from the publications of recognized historians in several fields of European history. 3 seminars. Prerequisite: Junior standing.

Hist 302 American Historiography (3)

Critical studies in historical sources and methods, with examples from the publications of recognized historians in American history. 3 seminars. Prerequisite: Junior standing.

Hist 307, 308, 309 Latin American History (3) (3) (3)

Imposition of Spanish and Portuguese institutions upon native American cultures; resultant colonial political and economic administrations and problems. Ideological and commercial conflicts causing the wars for independence; clashes during the national period of constitutionalism and dictatorships, vested interests and economic change. Significance of the Mexican and Cuban social revolutions. 3 lectures. Prerequisite: Junior standing.

Hist 311, 312, 313 British History (3) (3) (3)

History of the English people from the Roman era to the present. Development of law, language, religion, literature, and the struggles for parliamentary government and economic opportunities. 3 lectures. Prerequisite: Junior standing.

Hist 314 The Middle East (3)

Islamic civilization, the Ottoman Empire, origins of Pan-Islamism, Arab, Turkish, Iranian nationalism, impact of World Wars I and II, and the background of contemporary problems. 3 lectures. Prerequisite: Junior standing.

Hist 321 Chicano History in the American Southwest (3)

History of the struggle of the Mexican community within the United States for recognition and preservation of its culture, and for economic and social equity. 3 lectures. Prerequisite: 3 units of American history.

Hist 325 Ethnic Groups in American History (4)

Role of ethnic, racial, and religious minorities; their contributions to the political, economic, and social development of American life. 4 lectures. Prerequisite: Junior standing.

Hist 331 Early Afro-American History (3)

Political and social history of Afro-Americans from the early 17th century to the end of the Reconstruction. Contributions to American cultural and political life. 3 lectures. Prerequisite: Junior standing.

Hist 332 Recent Afro-American History (3)

Political and social history of Afro-Americans from the end of Reconstruction to the present as background of contemporary developments. 3 lectures. Prerequisite: Junior standing and Hist 331

Hist 341 Mexican History (3)

Obtrusion of Spanish institutions into the Mexican civilizations and the subordination of Spanish influence to the dominant Mexican cultures. Diffusion and struggle for identity of the Mexican in North America, progress of his twentieth-century revolt for social equity. 3 lectures. Prerequisite: Junior standing.

Hist 348 Renaissance and Reformation in Europe (4)

Decline of medieval universalism; rise of commercial capitalism and dynastic nation-states; flowering of the Renaissance; Protestant reformation. Economic, political, social, intellectual, and cultural influences. 4 lectures. Prerequisite: Junior standing and Hist 102 or equivalent.

Hist 349 Counter-Reformation, Absolutism, and Religious War (4)

The era of the Counter-Reformation and Divine Right absolutism, religious and dynastic wars and their impact on the political, economic, social, religious and cultural fabric of European civilization. 4 lectures. Prerequisite: Junior standing and Hist 102 or equivalent.

Hist 351, 352, 353 Modern European History (3) (3) (3)

Growth of political institutions; development of national states; imperial rivalries; origins of World War I; peace settlements; totalitarianism; World War II; developments since 1945. 3 lectures. Prerequisite: Hist 101 and 102, or permission of the instructor.

History

Hist 381, 382 African History (3) (3)

Survey of African history from earliest times; ancient African civilizations, Moslem penetration, indigenous kingdoms, European colonialism, rise of African nationalism, development of independent Africa as illustrated by the history of selected countries. 3 lectures. Prerequisite: Junior standing.

Hist 400 Special Problems for Advanced Undergraduate (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of the department head.



Hist 401 Early American History to 1763 (4)

Age of exploration; European powers in eastern North America; English settlements; development of the English colonies, with emphasis on Virginia and Massachusetts; proprietary interests; growth of internal control, and colonial conflicts. 4 lectures. Prerequisite: Junior standing and Hist 201 or consent of instructor.

Hist 402 American Revolution and the New Nation (4)

Background of the Anglo-American imperial problem; the War for Independence and internal democratic upheaval of the era; establishment of the new nation, origins of the Constitution, the party system, American foreign policy, the national economy. 4 lectures. Prerequisite: Junior standing and Hist 201 or consent of instructor.

Hist 403 Early Jacksonian Eras (4)

Growing nationalism and simultaneous development of sectional rivalries; emerging two-party system; the transportation revolution; early industrialization; and a changing social order. 4 lectures. Prerequisite: Junior standing and Hist 201 or equivalent.

Hist 404 Civil War and Reconstruction (4)

Interaction of political, social and economic forces with personalities and ideas in a period in which the political process failed to function. 4 lectures. Prerequisite: Junior standing and Hist 202 or equivalent.

Hist 405 Rise of Industrial America (4)

Social, political, and economic history during the latter part of the 19th century. Interaction between rising industrialism and traditional agrarian democracy. Relationship between the industrial system and the values of democratic institutions. 4 lectures. Prerequisite: Hist 202 or equivalent and junior standing.

Hist 406 Early Twentieth Century America (4)

Economic, social, intellectual, and political history, and foreign policy. Progressive response to problems of industrialization, agriculture, and urbanization; development of the American corporate business system; era of normalcy and onset of the depression. 4 lectures. Prerequisite: Junior standing and Hist 202 or 204 or equivalent.

Hist 407 United States Since 1929 (4)

Major developments of the mid-twentieth century. Change and growth in domestic and foreign policies; the Depression, New Deal, World War II, Cold War. Problems of world leadership and contemporary domestic problems. 4 lectures. Prerequisite: Junior standing and Hist 202 or 204 or equivalent.

Hist 411, 412, 413 History of East Asia (3) (3) (3)

Social, political, economic, and intellectual developments in Japan, China, Korea, and Southeast Asia from earliest times to the present. 3 lectures. Prerequisite: Junior standing.

Hist 425, 426, 427 Russian History (3) (3) (3)

Evolution of Russian autocratic society from the emergence of Muscovy to the consolidation of the Soviet Society. 3 lectures. Prerequisite: Junior standing.

Hist 460 Senior Project (2)

Selection and completion of a project under faculty supervision. Results presented in a formal report. Minimum of 60 hours time. Prerequisite: Hist 301 or 302

Hist 463 Undergraduate Seminar (2)

Historical analysis of selected problems and topics for undergraduates. Prerequisite: Hist 301, 302

Hist 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

Hist 511 Sources in History (3)

Methods of finding and adapting authoritative source materials in history to the elementary and secondary classroom. 3 lectures. Prerequisite: Graduate standing.

Hist 521 Curriculum and Methods in History (3)

Content, organization and scope of social studies curriculum in secondary schools, methods of teaching. Evaluation of procedures. 3 meetings. Prerequisite: Major or minor in History or Social Sciences, admission to teacher education program and Graduate standing.

Hist 590 Seminar in History (3)

Historical analysis of selected problems and topics. Each seminar will carry a subtitle descriptive of its content. 3 meetings. Maximum of 6 units may be earned. Prerequisite: Graduate standing.

HOME ECONOMICS

HE 101 Orientation to Home Economics (1)

Exploration of professional opportunities available in home economics; advantages, disadvantages and the personal and professional qualifications required. Basic programs in home economics and the educational requirements of the College. 1 lecture.

HE 121 Introduction to Foods (5)

Formation and illustration of basic concepts of the scientific principles in food preparation. Supporting factors necessary for successful meal preparation. 3 lectures, 2 two-hour laboratories.

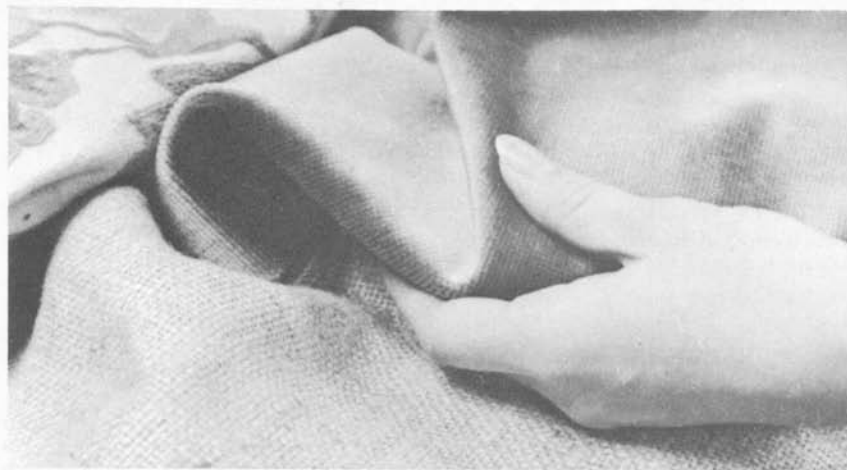
Home Economics

HE 122 Design Analysis for Home Economists (2)

Directed laboratory experience in use of design principles in everyday situations of costume coordination, food presentation, and home furnishings. 2 two-hour laboratories.

HE 131 Clothing Construction (3)

Basic studies in clothing construction. Emphasis on care, performance, fabric, and design. Application to consumer education. 1 lecture, 2 three-hour laboratories.



HE 132 Special Fabric Construction Techniques (2)

Selected experiences in clothing construction using a variety of special fabrics. 2 laboratories. Prerequisite: HE 131 or consent of instructor.

HE 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

HE 203 Personal and Home Management (3)

Application of home management principles to personal and family situations. Relationship of values, standards and goals to the allocation of resources and the decision-making process. 3 lectures. Prerequisite: Sophomore standing.

HE 207 Problems of Family Living (3)

Effects of various housing conditions on the dynamics of family life in the home. Emphasis on consumer housing problems of low income families. 3 lectures.

HE 210 Nutrition (3)

Nutritional needs throughout the life cycle. Chemical composition of foods and their utilization in the body. 3 lectures. Men and women of sophomore standing or over.

HE 226 Home Food Conservation (2)

Conservation techniques to obtain maximum control of food quality with most efficient use of time, energy, and economic resources. 1 lecture, 1 two-hour laboratory. Prerequisite: HE 121

HE 229 Food Selection and Preparation (3)

Food supply, availability, quality and cost; food legislation; buying practices. Economic, nutritional, and aesthetic considerations in meal management. 2 lectures, 1 activity. Open to men and women. Prerequisite: Non-Home Economics major or permission of instructor.

HE 237 Children's Clothing (3)

Design, construction, and selection of children's clothing. Emphasis upon the psychological, physiological, and developmental needs of various age levels. Comparative analysis of self-made and ready-to-wear clothing. 2 lectures, 1 laboratory. Prerequisite: CD 233 or consent of instructor.

HE 241 Pattern Construction Analysis (3)

Pattern design analyzed through the basic techniques of fitting and use of flat pattern. 1 lecture, 2 laboratories. Prerequisite: HE 131 or consent of instructor.

HE 242 Interior Design (4)

Analysis of elements of interior design including consumer and socio-economic aspects. Individual creative laboratory experience in problems related to living space. 3 lectures, 1 two-hour laboratory. Prerequisite: HE 122

HE 310 Maternal and Child Nutrition (3)

Nutritional requirements from conception to adolescence; role of nutrition in normal development. 3 lectures. Prerequisite: HE 210

HE 321 Meal Management (3)

Planning, preparing, and serving family meals. Emphasis on nutritional, aesthetic, and economic aspects. 1 lecture, 2 two-hour laboratories. Prerequisite: HE 121, 210

HE 322 Textiles (3)

Physical and chemical characteristics of natural and synthetic fibers. Yarns, fabrics, and textile finishes. Application of theory to textile fabrics. Selection, use, and care. 2 lectures, 1 three-hour laboratory. Prerequisite: Chem 226

HE 323 Housing for Contemporaries (3)

Basic principles and functions of house selection, planning, and decoration as they relate to: expressions of personality, architectural design and setting, and socio-economic levels. Arch 312 will substitute. 3 lectures. Prerequisite: HE 242, junior standing.

HE 324 Management of Consumer Resources (3)

Basic home management principles of values, goals, decision-making, and resources as directly related to individual and family consumption patterns. 3 lectures. Prerequisite: HE 203, Ec 201

HE 326 Demonstration Techniques (2)

Development of effective means of communication by use of the demonstration technique, through presentations with evaluations. 2 laboratories. Prerequisite: Sp 201, HE 331 or consent of instructor.

HE 328 Advanced Nutrition (3)

Nutrient requirements of man; factors affecting requirements. Biochemical and physiological functions of nutrients and their interactions in the body. Evaluation of nutritional status. Topics in nutrition research. 3 lectures. Prerequisite: HE 210, Chem 226, Zoo 131

HE 331 Household Equipment (4)

Principles involved in construction, operation, use, selection and safety of household equipment. 2 lectures, 2 two-hour laboratories. Prerequisite: Junior standing.

HE 332 Advanced Interior Design (2)

Individual creative experiences in problems of interior design. 2 laboratories. Prerequisite: HE 242

HE 333 Costume Design and Construction (3)

French draping fundamentals. Designing for the individual and the fabric. Advanced fitting techniques. 1 lecture, 2 laboratories. Prerequisite: HE 241 or consent of instructor.

HE 341 Dynamics of Clothing (3)

Socio-psychological, economic and aesthetic aspects of clothing as related to human behavior. 3 lectures. Prerequisite: Junior standing.

Home Economics

HE 348 Advanced Nutrition Laboratory (2)

Nutrient requirements and their evaluation. Quantitative laboratory techniques used in nutrition research. 2 three-hour laboratories. Prerequisite: HE 328 or consent of instructor.

HE 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Senior standing or consent of instructor.

HE 409 Furniture Design (3)

Development of furniture styles and their environments from ancient times to the present. Adaptability of individual furniture types to contemporary interiors. 3 lectures.

HE 410 Community Nutrition (3)

Problems inherent in improvement of nutrition at the community level. Relation to local, state, and national nutrition programs. Role of the nutritionist in public health, social welfare, agricultural extension, and school lunch program. 2 lectures, 1 two-hour laboratory. Prerequisite: HE 210

HE 411 Curriculum and Methods for Homemaking Education (4)

Development of a timely philosophy in consumer and homemaking education. Classroom management, procedures, curriculum development, teaching aids and evaluating techniques for teaching homemaking in junior and senior high schools, including federally reimbursed programs. Field trips required. 4 lectures. Prerequisite: Consent of instructor.

HE 412 Home Economics Student Teaching Seminar (3)

Practices and problems of student teaching in Home Economics. Synthesizes professional study and experience to develop teaching competence. Taken concurrently with student teaching. 3 lectures.

HE 413 Adult Consumer and Homemaking Education (2)

Objectives, methods, content and evaluation procedures for teaching adult consumer and homemaking education with emphasis on programs of service to low income families. 2 lectures. Prerequisite: HE 411 or consent of instructor.

HE 415 Methods of Teaching Nutrition (3)

Identification of nutrition learning needs and problems at various stages of the life cycle. Selection of valid content and learning activities for a variety of teaching situations and strategies in community, classroom and clinic. 3 lectures. Prerequisite: HE 210, Ed 312, Senior standing.

HE 421 Meals for Special Occasions (2)

Distinctive foods as related to gourmet, regional, national, and international cuisine. 1 lecture, 1 laboratory. Prerequisite: HE 121 or consent of instructor.

HE 422 Advanced Textiles (3)

Advanced study of fiber structure and fabric properties as related to fabric performance. Laboratory testing of fibers and fabrics. 2 lectures, 1 three-hour laboratory. Prerequisite: HE 322

HE 425 Quantity Cookery (3)

Economic principles and problems involved in planning and preparing food using institutional equipment to meet specific product standards for large groups. 1 lecture, 2 laboratories. Prerequisite: HE 328 or consent of instructor.

HE 426 Food Production Management (3)

Principles of successful organization and management with their application to the effective operation of food service. Administrative responsibilities of the food service manager. Advance reservation with instructor required. 3 lectures. Prerequisite: HE 425 or consent of instructor.

HE 427 Equipment and Layout (3)

Selection, maintenance and arrangement of equipment and furnishings for food service departments with emphasis on materials, construction and specifications. Designated field trips required. 2 lectures, 1 laboratory. Prerequisite: HE 426 or consent of instructor.

HE 429 Diet Therapy (3)

Modification of normal food intake and dietary patterns, with emphasis on dietary adjustments necessitated by certain disease processes and conditions. 3 lectures. Prerequisite: HE 328

HE 433 Historic Costume (3)

Costumes of the past as related to contemporary fashions. 3 lectures. Prerequisite: HE 241 or consent of instructor.

HE 442 Tailoring (2)

Selection and construction of tailored garments. 2 laboratories. Prerequisite: HE 241 or consent of instructor.

HE 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision, the project to be related to a probable field of employment. Results of the study are presented in a formal report. Minimum of 120 hours to be used in making the study. Prerequisite: All freshman, sophomore, and junior home economics courses must be completed.

HE 463 Undergraduate Seminar (2)

Development of the home economics profession. Discussion of current social issues and their relation to home economics. Reporting of recent trends and discussion of the future directions of the field. 2 lectures. Prerequisite: Senior standing.

HE 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

HE 500 Individual Study (1-3)

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Prerequisite: Consent of the department head, the graduate major adviser, and the supervising faculty member.

HE 501 Management of Family Resources (3)

Principles, major problems and trends in the economics of the family. 3 lectures. Prerequisite: Graduate standing.

HE 511 Research Design (3)

Methods of research and critical analysis of scientific literature and problems in home economics. 3 lectures. Prerequisite: Graduate standing.

HE 523 Time Management (3)

Developing and selecting labor-saving methods and devices for the able-bodied and handicapped. Individual and group investigation. Survey of literature. Current trends and methods of research. 2 lectures, 1 two-hour laboratory. Prerequisite: Graduate standing.

HE 525 Experimental Studies in Textiles (4)

Review and reporting of pertinent studies in textile research. Testing of fabrics using equipment available. 3 lectures, 1 laboratory. Prerequisite: HE 422 and graduate standing.

Humanities

HE 528 Experimental Studies in Foods (4)

Experimental approach to the study of chemical and physical properties of interaction components of selected foods; correlated emphasis on selection, application, and evaluation of pertinent literature. 3 lectures, 1 laboratory. Prerequisite: Graduate standing.

HE 532 Problems and Trends in Interior Design (3)

Current developments in design, materials, and coordination of home furnishings. Individual problems. 2 lectures, 1 two-hour laboratory. Prerequisite: Graduate standing or consent of instructor.

HE 580 Graduate Seminar (1-3)

Advanced study of current issues and topics significant for professional home economists. Class schedule will list topics selected. 3 lectures. Maximum of 6 units may be earned. Prerequisite: Graduate standing.

HE 582 Graduate Seminar in Nutrition (1)

Critical review of literature on selected topics in the field of nutrition. Topics changed each quarter. May be repeated to 3 units. Prerequisite: HE 210, 328, graduate standing.

HE 583 Administration and Supervision of Home Economics Programs (3)

Topics based on realistic concerns of those preparing for supervisory and administrative responsibilities in home economics programs in secondary schools and community colleges. 3 lectures. Prerequisite: Graduate standing or consent of instructor.

HE 599 Thesis (3) (3)

Individual research under the general supervision of the staff, leading to a graduate thesis of suitable quality. Prerequisite: Graduate standing.

HE 621 (A-Z) Workshop (Various titles as required) (1½)

Special workshops organized either on the initiative of the college or at the request of special groups. Normally offered during the summer. Credit granted at the rate of 1½ units per week.

HUMANITIES

Hum 270 Contemporary Ideas (3)

Interdisciplinary study of human values as they relate to one or more areas of these disciplines: history, literature, philosophy, and the arts. 3 lectures. Prerequisite: Phil 101 or consent of the instructor.

Hum 350 Esthetics (3)

Interdisciplinary investigation of artistic phenomena and esthetic experience which may emphasize psychology, philosophy, history, arts, or literature. 3 lectures. Prerequisite: Phil 101

Hum 402 Human Values in Engineering (3)

Humanistic and social sciences learning for the engineer. 3 lectures. Prerequisite: Hist 205, Ec 201, Engl 207 or equivalent.

Hum 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Results presented in a formal report. Minimum of 120 hours time.

Hum 463 Undergraduate Seminar (2)

Review and discussion of student projects and other research topics of academic and practical significance. 2 lectures.

INDUSTRIAL ENGINEERING

IE 101 Introduction to Industrial Engineering (3)

Historical development of the industrial economy and the profession of industrial engineering. Basic concepts and principles of industrial organization and management. Formal records of dollar flow. The dynamics of the industrial enterprise and the functional activities associated with industrial engineering. 3 lectures.

IE 111 Introduction to Measurement Science (3)

Historical development of measurement science and its contribution to industry, engineering and government. Fundamental concepts of the basic units of length, time, mass, temperature, electric current, and luminous intensity. Determination of other measurement units with their particular problems. 3 lectures.

IE 123 Industrial Systems Analysis (4)

Systems, subsystems, and relationships (interfaces) of industrial systems concepts in modern productive society. Trends in techniques for data gathering, analysis, and presentation for management decisions. Formal report of selected operating system required. 3 lectures, 1 laboratory.

IE 141 Manufacturing Processes (1)

Principles, practices and theory of metal casting, sand and shell molding; precision investment casting; die casting; plastic forming and molding. Basic fundamentals and theory of pattern making and hot forming by forging methods. 1 laboratory.

IE 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

IE 201 Production Costs Estimating (3)

Estimating the costs of a finished product from design and marketing information. Product material costs, processing and assembly labor costs, investment costs, overhead costs for typical manufactured items. Compilation of segmented cost information into a final result for engineering, customer, or marketing purposes. 3 lectures. Prerequisite: Sophomore standing

IE 202 Motion and Time Study (3)

Principles, tools, and techniques for methods improvement and the setting of time standards. Motion and time study as used by management for planning and control. A study of methods for systems analysis. 3 lectures. For Non-IE Students. Prerequisite: Junior Standing.

IE 204 Industrial Safety (2)

History of industrial safety; fire prevention; personal protective equipment; health hazards; machinery safeguards; electrical hazards; plant inspection; accident insurance. 2 lectures.

IE 214 Production Control (2)

Production control in the industrial complex. Basic functions of routing, scheduling, dispatching, and expediting. Studies in forecasting, estimating, and inventory control using linear programming and critical path method techniques. 2 lectures. Prerequisite: Sophomore standing.

IE 215 Production Systems (3)

The production function, tasks which must be performed, and the organization needed in a manufacturing operation. Development of quantitative methods to solve production problems. 3 lectures. Prerequisite: Stat 211

Industrial Engineering

IE 223 Man-Machine Systems (4)

Principles of motion economy, work simplification, flow charting in work analysis methods, work sampling, micro-motion analysis, and synthetic data. Quantitative analysis of time studies, allowance and performance ratings. Integration of these methods in man-machine systems. 3 lectures. 1 laboratory. Prerequisite: IE 123 or equivalent.

IE 231 Production and Process Planning (3)

Systems design of integrated manufacturing facilities. Analysis techniques and procedures for production and process planning; operation and assembly process charts, flow process charts, flow diagrams, travel and activity relationship charts. Materials handling, plant layout project. For non-IE students. 2 lectures, 1 laboratory. Prerequisite: Sophomore standing

IE 232 Dimensional Metrology (2)

Fundamental theory of dimensional metrology including inspection tools, standards, techniques, and application for linear measurements in industry. Design and application of direct-measuring tools, optical, pneumatic and electronic comparators, gages, and optical flats. 1 lecture, 1 laboratory. Prerequisite: Sophomore standing, or consent of instructor.

IE 233 Elements of Numerical Control Machining (2)

Theory, principles, and concepts of numerical control of machine tools. Principles and application techniques of various control media. Orientation in concepts of continuous path and point-to-point systems. Part programming including control tape preparation for numerical control drilling. 1 lecture, 1 laboratory. Prerequisite: ET 153, MP 142

IE 239 Industrial Costs and Controls (4)

Manufacturing costs in production planning, cost analysis and cost control. Budgeting production costs and analysis of variance from actual costs as principal keys to cost control, inventory valuation, and pricing. Techniques of value analysis/cost reduction. 3 lectures, 1 laboratory. Prerequisite: IE 101 or Actg 132

IE 240 Additional Engineering Laboratory (1-2)

Total credit limited to 4 units, with not more than 2 units in any one quarter. 1 or 2 laboratories.

IE 251 Manufacturing Engineering Laboratory (4)

Engineering studies encompassing theory, principles, and concepts of manufacturing engineering in industry. Experimental projects in properties of materials, heat treatment, metals, plastics, metrology, powder metallurgy, and analysis by instrumentation of cutting tool forces. 2 lectures, 2 laboratories. Prerequisite: Chem 124

IE 304 Operations Research (3)

Preliminary study of basic management science tools and techniques. Probability applications, sampling analysis, inventory models, and waiting lines. Application to common production control problems. 3 lectures. Prerequisite: Stat 321

IE 312 Data Analysis (3)

Applying basic filing systems, tab cards and computers to data collection and analysis. The planning, design, and use of auxiliary files for electronic data processing. Survey of pertinent computer languages. The need for, and usage of, data in managing production systems. 2 lectures, 1 laboratory. Prerequisite: Engr 251

IE 319 Human Factors Engineering I (3)

Areas covered by human factors. Understanding of man's psychological and physiological characteristics. Human reactions and capabilities related to specific tasks and systems. Design of machines, operations, and work environment to match human capacities and limitations. 3 lectures. Prerequisite: Psy 202 and Junior standing.

IE 341 Product Development and Manufacture (4)

Systems-design approach to product conception, prototype development and production design. Production methods, human factors, and planning of integrated manufacturing facilities. 2 lectures, 2 laboratories. Prerequisite: IE 252

IE 343 Manufacturing Design (4)

Development of manufacturing data for process design and plant layout. Theory, principles, and techniques for research and product development involving detail design, prototype production, production drawings, process charts. Planning for the product, equipment, and facilities. 2 lectures, 2 laboratories. Prerequisite: IE 304

IE 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

IE 401 Sales Engineering (2)

Concepts and principles of engineering in sales. Role of the professional engineer in the analysis, design, development, production, and final application of a product or system required by the buyer. 2 lectures. Prerequisite: Senior standing in Engineering.

IE 403 Principles of Engineering Economy (3)

Development of methods to assess time value of money through mathematical models for evaluating economic factors in the making of individual or industrial decisions. 3 lectures. Prerequisite: Senior standing in other than engineering.

IE 404 Information Economics (3)

Cost of information, measures of information, man as a noisy information channel, inspection as an information process, sampling as a step in statistical inference, and the engineering decision process. 3 lectures. Prerequisite: Math 242, Stat 321

IE 408, 409 Manufacturing System Optimization (3) (3)

Optimization of waiting line queues. Application of Markov chains and stochastic processes to production control problems. Advanced dynamic programming. Information and statistical analysis of critical path technique, mathematical programming problems and queues using computer analysis tools. 2 lectures, 1 laboratory. Prerequisite: Math 242, Stat 321, IE 304

IE 411, 412 Organization for Manufacturing (2) (2)

Principles and techniques of administration and organization of the activities of an industrial enterprise. Planning, organization, staffing, direction and control functions in activities of: facilities, manufacturing processes, plant location, job evaluation and wage incentives, inventory control, production control, procurement, and sales. 2 lectures. Prerequisite: For non-IE students of Senior or advanced Junior standing or consent of instructor.

IE 414 Engineering Economy (3)

Categories of engineering decisions. Interest rates in the industrial complex. Basic principles and tools of analysis. Application to industrial engineering through the use of case studies. 3 lectures. Prerequisite: Senior standing in Engineering.

IE 417 Advanced Systems Analysis (3)

Analysis of the economic value of information to sequential decision processes. Decision making models using Boyes Criteria and mini-max game models. Application of decision theory and information value concepts to production control problems. Cost effectiveness and break even analysis in production problems. 3 lectures. Prerequisite: Math 242, Stat 321, IE 419

IE 419 Operations Research (3)

Introductory study of game theory. Linear programming, dynamic programming, and schedule sequencing. Computer programming in solution of problems. 3 lectures. Prerequisite: IE 304

Industrial Engineering

IE 420 Industrial Systems (3)

Application of general systems theory to industrial systems. Man as a system element. Analytic and simulation methods of optimization. 2 lectures, 1 laboratory. Prerequisite: Math 143, Engr 251, IE 304

IE 421 Manufacturing Organization (3)

Theory and principles of manufacturing organization systems and sub-systems. Analysis of the processes of production management. Use of systems approach to achieve unification of the production elements in terms of both analysis and synthesis, and interrelation between parts of the enterprise and the whole. 3 lectures. Prerequisite: IE 309, 343

IE 422 Manufacturing Management (3)

Integration of concepts of organization and management with sub-systems utilized in each segment of the manufacturing enterprise. 3 lectures. Prerequisite: Senior standing.

IE 423 Public Problem Project Systems Engineering (3)

Exploration of the difficulties and possible solutions associated with a particular public problem selected by the class made up of non-engineers. Systems engineering and related methods are applied including the use of optimizing models based upon elementary algebra. 3 lectures. Prerequisite: Senior standing, non-engineer.

IE 424 Engineering Test Design and Analysis (3)

Methods for designing engineering tests or experiments. Interpretation of data. Tests of evaluation and comparison; Weibull Distribution; analysis of variance; factorial and partial factorial experiments; accelerated tests for trade-off between sample size and testing time; life testing of parts; Weibull analysis including warranty data; sequential analysis; fatigue testing; and non-parametric tests. 3 lectures. Prerequisite: Stat 321 or equivalent.

IE 425 Reliability Assurance (3)

Reliability mathematical models, mechanical device reliability, electrical device reliability, reliability data, assurance program elements. 3 lectures. Prerequisite: Math 242, Stat 321, CSc 219 or IE 304

IE 429 Materials Handling (2)

Conceptual studies in effective movement of materials, including economic aspects of design of plant facilities. Transportation in-plant and to the consumer. 1 lecture, 1 laboratory. Prerequisite: Senior standing.

IE 430 Statistical Quality Control (3)

Statistical theory of sampling to analyze output variation. Managerial methods to control attributes of incoming or in-process material. Quantitative risk factors for decisions based on sampling procedures with associated operating characteristics and control charts. Case studies and experiments. 2 lectures, 1 laboratory. Prerequisite: Stat 321

IE 431 Systems Engineering (3)

Treatment of the systems concept within the national industrial complex involving men and facilities. Quantitative methods of management and planning, including operations research. 2 lectures, 1 laboratory. Prerequisite: Math 143 and upper division standing, or consent of instructor.

IE 434 Precise Mass and Flow Measurements (3)

Theory and techniques for precise measurement of mass, weight, density, acceleration, flow, and viscosity. 3 lectures. Prerequisite: ME 341

IE 437 Human Factors Engineering II (3)

Principles, concepts and theoretical models used in evaluating and maximizing human performance capacities. Utilization of experimental methods in defining techniques for generating rational data relative to men and machines, and the interpretation of these data. 2 lectures, 1 laboratory. Prerequisite: IE 319 and Stat 321 or equivalent.

IE 438 Precise Heat and Pressure Measurements (3)

Theory and techniques for precise measurement of heat quantity, specific heat, heat conductivity and heat flow, calorimetry, sensors for temperature and pressure, recording devices, pyrometry, vapor pressure. 2 lectures, 1 laboratory. Prerequisite: ME 302, 341, EL 322, IE 235

IE 441, 442 Fundamentals of Supervision (2) (1)

Theory and principles of supervision. Application of fundamental concepts and techniques of supervision provided by assignment in manufacturing laboratories. 2 laboratories, 1 laboratory. Prerequisite: IE 233

IE 444 Value Engineering (3)

Analysis of design, material, and process to obtain desirable functional performance at minimum cost. Application to manufacturing products, systems, and services. 2 lectures, 1 activity. Prerequisite: IE 343 or consent of instructor.

IE 451 Advanced Industrial Engineering Laboratory (2)

Theory, concepts, and applications in manufacturing planning and research. Verification and/or validation of manufacturing processes theories. 2 laboratories. Prerequisite: IE 341.

IE 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours of total time.

IE 463 Undergraduate Seminar (2)

Preparation, oral presentation, and discussion by students of technical papers on recent engineering developments and/or subject matter pertinent to industrial engineering. 2 lectures. Prerequisite: Senior standing in IE.

IE 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

INDUSTRIAL RELATIONS

IR 118 Human Relations (3)

Selected concepts in human relations, their integration and application to managerial environment and functional fields of business administration. 3 lectures.

IR 211 The Labor Movement in the United States (3)

Labor movement theories, American trade-union development, union management, labor and economic political power, variations in labor movements. 3 lectures.

IR 314 Industrial Relations (3)

The industrial relations function and its relationships within the business and industrial environment. The personnel management function; foreign labor movements. Relations among unions, management and the public. 3 lectures.

IR 315 Personnel Administration (3)

Organization and manpower planning, recruitment, selection and placement of employees. Employee education and development. Interviewing, testing, reference checking, performance appraisal, wage and salary and other personnel functions. 3 lectures. Prerequisite: IR 314

IR 316 Labor Contract Administration (3)

Simulation techniques designed to prepare representatives of labor, management, and government agencies to resolve problems involving contracts between unions and companies. 3 lectures. Prerequisite: IR 211 or consent of instructor.

Industrial Relations/Industrial Technology

IR 319 Wage and Salary Administration (3)

Functions of management that involve planning, developing, directing, and controlling all phases of employee and management compensation. Areas included are: job evaluation, employee evaluation, and related areas. 3 lectures. Prerequisite: IR 314

IR 410 Supplemental Employee Benefits (3)

Supplemental benefit programs for employees. Effect on payroll and other costs, contract negotiations, employee relations. Pensions, hospitalization, insurance, supplemental unemployment benefits, job security, vesting rights, bonuses, severance pay, profit sharing plans. 3 lectures. Prerequisite: IR 314

IR 412 Collective Bargaining (4)

Collective bargaining in the relationship between management and labor in a simulated situation. The bargaining unit, recognition, development of the labor agreement, and case studies of strikes, picketing, boycotts, unfair labor practices, mediation and arbitration. 4 lectures. Prerequisite: IR 316

IR 413 Labor Law (3)

Federal and state labor laws and their effects upon labor, management, and the public. Effects of current executive orders. 3 lectures. Prerequisite: Bus 201 or 207

IR 415 Business and Human Relations (3)

Individual and group practice emphasizing the aims of management training in the behavioral sciences to achieve greater individual job effectiveness, improve interpersonal relationships in the organization, and enhance individual adjustment to the context of his total environment. 3 lectures. Prerequisite: IR 118 and senior standing or consent of instructor.

INDUSTRIAL TECHNOLOGY

IT 101 Technical Computation (2)

A study of the techniques used in the analysis and solution of typical technical problems. Emphasis on the need for orderly work, checking procedures, handling and presenting scientific data; purpose and presentation of technical reports. 2 lectures.

IT 111 Introduction to Industrial Technology (2)

Orientation to the objectives of the Industrial Technology Department. Investigation of employment opportunities. Development of techniques useful to the student in his study. 2 lectures.

IT 125 Industrial Wood Processes (2)

Analysis of basic woodworking equipment, processes and materials currently used in lumbering, mill-cabinet, general construction and related industries. Theory and practice in the use of woodworking equipment. 1 lecture, 1 laboratory.

IT 130 Automotive Fundamentals (1)

Principles of operation and familiarity with basic components of the automobile from the consumer viewpoint. Economics of selection, operation, and preventive maintenance. Practical experience, owner inspection, maintenance and repair. Understanding of pollution control systems. 1 laboratory.

IT 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

IT 222 Power Technology: Sources (4)

Analysis of power sources: natural, steam, internal combustion, continuous combustion, nuclear energy, fuel cells, photo cells, thermal electricity. Transmission of power: clutches, gear trains, wrapped connectors, hydraulics, pneumatics, universal joints, bearings, lubricants. 2 lectures, 2 activities. Prerequisite: Phys 122.

IT 233 Metal Technology (3)

Theory and practice in care and use of hand and machine tools. Applications of welding, forging, foundry, sheet metal, ornamental metal, machine shop and bench metal processes to the fabrication of industrial products. 3 activities. Prerequisite: MP 141, 142; Weld 141, 142; MP 143; IE 141

IT 237 Industrial Electricity (5)

Theory and application of basic A-C and D-C circuits. Magnetic circuits. Principles of motors and generators, instruments, control and control circuits, transformers and circuitry, oscilloscopes. 4 lectures, 1 laboratory.



IT 241 Introduction to Manufacturing Technology (2)

Current and new basic industrial materials, processes and applications. Manufacturing in electronics, metals and machine tools, mass production processes, graphic arts, power technology, plastics, wood technology, innovations in drafting. Primarily for non-Industrial Technology majors. 2 activities.

IT 245 Technical Sketching (2)

Freehand sketching of industrial products using perspective, isometric oblique and orthographic projection. Shading. Basic design. 2 activities. Prerequisite: ET 151

IT 304 Product Quality Control (3)

Applications at the supervisory level of the overall quality plan for manufacturing. Quality assurance, testing, shop and field inspection techniques, material review, source inspection, vendor surveillance, and quality audit. 3 lectures.

IT 324 Modern Industrial Finishes (2)

Characteristics and applications of finishes to modern industrial products. Brushing, dipping, spraying, baking, plating, etching. 2 laboratories.

IT 326 Product Evaluation (2)

Procedures in the gathering, preliminary analysis and practical application of quality and reliability field data by industrial sales and service personnel. Principles of value engineering and production quality control techniques in relation to customer needs. 2 activities. Prerequisite: Junior standing.

Industrial Technology

IT 327 Plastics Technology (2)

Technical processes, materials, tools and equipment used in plastics manufacturing. Foam, expandable bead and liquid casting, injection molding, thermo-forming, dip-coating, laminating and plastic welding processes. Basic operations in plastic pattern-making, cutting, fabricating, and finishing. 1 lecture, 1 laboratory. Prerequisite: IT 125, MP 141, 142, Chem 122

IT 329 Industrial Materials (3)

An investigation of the characteristics, applications and limitations of materials of industry including: plastics, glass, ceramics, rubber, abrasives and adhesives, wood, fuels and lubricants. 2 lectures, 1 activity. Prerequisite: Junior standing.

IT 330 Principles and Practices of Industrial Arts (5)

Techniques and procedures for teaching industrial arts; observations in neighboring schools; survey of methods applicable to teaching drafting, crafts, wood, metal, electricity-electronics, graphic arts, power mechanics and general shop; shop organization; curriculum; evaluation; preparation for practice teaching. 3 lectures. 2 activities. Prerequisite: Junior standing.

IT 331 Industrial Electrical Systems (4)

Industrial applications of electrical concepts in distribution systems, industrial wiring, illumination, motors and controllers. 3 lectures, 1 laboratory. Prerequisite: IT 237, Math 131

IT 332 Electronic Control Systems (4)

Automated control devices from an operational and servicing viewpoint. Modular approach to the study of electronic control systems. 3 lectures, 1 laboratory. Prerequisite: Phys 122, IT 237

IT 333 Electronic Computer Applications (3)

Fundamentals of analog computers, electronic data processing machines, and numerical control of machine tools. Applications in production supervision, sales, and industrial education, fundamentals of logic and logic circuits, simulation. 2 lectures, 1 laboratory. Prerequisite: IT 237, or consent of instructor.

IT 336 Automotive Technology, Engines (3)

Engine overhaul and maintenance, theory and construction. Practical activities with various types of engines, including automotive, marine, and low horsepower power plants. 1 lecture, 2 laboratory. Prerequisite: IT 222, AE 335, 336

IT 339 Automotive Technology, Fuel Systems (2)

Fuel systems and fuels used in internal combustion engines. Carburetors, injectors, superchargers, manifolds, pumps, and storage tanks. Emission control systems. Types of fuels and their compounding. 1 lecture, 1 laboratory. Prerequisite: IT 222

IT 343 General Metals (3)

Applications of the various general metal fabrication processes to typical construction problems. Design and construction of instructional projects suitable for the secondary school industrial education program. Maintenance of metalworking equipment. 1 lecture, 2 activities. Prerequisite: IT 233 or consent of instructor.

IT 344 Technical Drawing (4)

Application of current drafting procedures in preparing complete graphic descriptions of industrial components. Sketching, lettering, instrument drawing, reproduction processes. Preparation of work drawings and specifications. Analysis of drafting materials, equipment and processes. 1 lecture, 3 activities. Prerequisite: IT 245, ET 142

IT 346 Industrial Design (2)

Applications of design principles to the various materials and processes of industry; development of a creative, problem-solving approach to design as it applies to industry. 2 activities. Prerequisite: IT 245

IT 350 Quality Systems Applications (3)

Philosophy and principles of quality system administration. Relationship to total systems program administration; impact on management information and data requirements. Quality system administration techniques applied to control performance, cost and schedule data, traceability, and retrievability. 3 lectures. Prerequisite: Stat 212, Junior standing.

IT 352 Additional Laboratory Problems (1-2)

Advanced instruction in the construction, repair, maintenance and use of laboratory equipment. Primarily for students intending to become industrial education teachers. Total credit limited to 4 units with not more than 2 units any one quarter. 1 or 2 laboratories. Prerequisite: Consent of instructor.

IT 353, 354, 355 Wood Technology (3) (3) (3)

Application of design principles, materials and construction techniques to mill cabinetwork, furniture manufacturing, and machine tool maintenance. Materials and methods used in modern industry. 3 activities. Prerequisite: IT 125

IT 356 Building Construction Techniques (3)

Examination of modern materials and construction methods as applied to home building; mass-production, custom-building and prefabrication. Field study of representative projects; laboratory experience in framing and basic processes. 3 laboratories. Prerequisite: IT 353

IT 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

IT 404 Customer Relations (2)

Customer contacts; personal relationships, ethics, legal relationships, service contracts, communication channels. 2 lectures. Prerequisite: Mktg 204. Senior standing or consent of instructor.

IT 405 Industrial Marketing (2)

Investigation of the institutions and channels involved in industrial marketing. Analysis of industrial products, competitors, and consumers. Problems in marketing research, personnel, and management. Individual reports on industrial products, companies or training programs. 2 lectures. Prerequisite: Mktg 204. Senior standing or consent of instructor.

IT 406 Cost Reduction and Control (3)

Application of cost control procedures at the foreman level. Techniques of cost reduction. Goals in reducing waste of material and defects in workmanship. 3 lectures. Prerequisite: Senior standing, IE 231

IT 407 Industrial Product Development (3)

Organization for new industrial product development, linking marketing, operations and technology functions; sources and screening of new product ideas, sizing and evaluation of market prospects, budgeting, pricing, timing, advertising and distribution factors as they relate to new industrial products, internal coordination during product development phases. 3 lectures. Prerequisite: IT 404, 405

IT 413 Plant Maintenance Management (3)

Maintenance and repair of plant facilities, operation of utility plants and systems and furnishing of utilities services, preventive maintenance, job control systems, and other essential services. 3 lectures. Prerequisite: senior standing.

IT 415, 416 Industrial Equipment Selection (3) (3)

Electrical and mechanical equipment making up the utility and production support systems of a modern industrial plant. Technical alternatives available in terms of economic choice for project profitability, capital budgeting in terms of industrial equipment planning. Forecasting of depreciation due to unusual wear, use, and technological obsolescence. 3 lectures. Prerequisite: IT 331, 432, Ec 212

Industrial Technology

IT 418 Technical Management Problems (4)

Organization and positions of key personnel in corporate technical management structure; their functions, duties and interfaces with operations, marketing, general management and research/development. Structure and objectives related specifications and proposals with case studies. 3 lectures, 1 activity. Prerequisite: Senior standing, Mgt 311, or consent of instructor.

IT 422, 423 Construction Equipment (2) (2)

Analysis of major types of construction equipment from a practical marketing viewpoint. Contract specifications, estimating, basic processes utilizing construction equipment, selection of appropriate equipment and equipment operation and maintenance. 1 lecture, 1 laboratory. Prerequisite: IT 222, 223, 237

IT 426 Automotive Technology, Chassis (3)

Fundamental, technical, and teaching aspects of automotive suspension systems, steering, braking, and other control systems. Tires and lubrication. 3 activities. Prerequisite: IT 223

IT 427 Automotive Technology, Electronics (3)

Applications of electronic and electrical systems in automotive type equipment including ignition, lighting, starting, charging, auxiliary systems, and control systems. 2 lectures, 1 laboratory. Prerequisite: IT 222, 237, AE 341

IT 428 Automotive Technology, Power Trains (3)

Advanced applications of clutches, gears, hydraulics, pneumatics, and wrapped connectors. Universal joints, bearings, and lubricants in automotive type equipment. 1 lecture, 2 laboratories. Prerequisite: IT 223

IT 431, 432 Mechanical Systems (3) (3)

Applications of basic physics to mechanical systems using the English system of units; various component systems. Steam systems, air conditioning and refrigeration systems, pneumatic and hydraulic systems, piping systems. 2 lectures, 1 activity. Prerequisite: Math 131, Phys 122, IT 223

IT 433 Mechanical Systems (3)

Case study of industrial manufacturing processes from an operational and service engineering viewpoint. Materials handling techniques. Production equipment and systems. 2 lectures, 1 activity. Prerequisite: Junior standing.

IT 438 Advanced Plastics (3)

Properties and characteristics of thermosetting and thermoplastic materials. Analysis and construction of molds and dies for use with reinforced plastics, injection molding, thermoforming processes; extrusion, and compression and transfer molding. Selection of plastics. 1 lecture, 2 activities. Prerequisite: IT 327

IT 441 Metal Production Processes (4)

Study of mass-production techniques; design, production planning, tolerances, jigs and fixtures, interchangeable parts, assembly line. Design and construction of projects suitable for industrial arts metal courses. 1 lecture, 3 activities. Prerequisite: IT 223, 343 or consent of instructor.

IT 446 Wood Production Processes (2)

Study of mass-production techniques; design, production planning, jigs and fixtures, interchangeable parts, assembly line. Design and construction of projects suitable for industrial arts wood courses. 2 laboratories. Prerequisite: IT 353, 433

IT 451 Electronics: Industrial Education (4)

Teaching applications of the principles and operation of non-linear devices such as vacuum tubes, semi-conductors and associated solid state components. Programs and experiments for the teaching of electronics at the secondary level. 3 lectures, 1 laboratory.

IT 452 Electronics: Industrial Education (5)

Construction, testing, trouble-shooting and repair of electrical and electronic equipment; appliances, radios, amplifiers and television. Use of typical high school electricity-electronics equipment and analysis of procedures. 3 lectures, 2 laboratories. Prerequisite: IT 451 or approval of instructor.

IT 453 Electronics: Industrial Education (3)

Planning, equipping and organizing a high school electricity-electronics industrial arts program. Course objectives and methods of teaching electricity and electronics at the high school level. Field trips to local high schools will be arranged. FCC regulations. 3 lectures. Prerequisite: IT 452

IT 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects results are presented in a formal report. Minimum 120 hours total time.

IT 463 Undergraduate Seminar (2)

Preparation, oral presentation and discussion by students of papers on related professional topics. 2 lectures.

IT 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

IT 500 Individual Study (1-3)

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Prerequisite: Consent of Department Head, graduate adviser and supervising faculty member.

IT 520 Organization and Administration of Industrial Education (3)

Case studies of current problems in the administration and organization of industrial arts and industrial-technical education. Problems in industry, financing industrial education, work-experience and adult education programs, and community education. 3 lectures. Prerequisite: Student teaching or consent of instructor.

IT 521 Curriculum in Industrial Education (3)

Basic principles and practices in the preparation of course guides, courses of instruction and related materials for industrial instruction. 3 lectures. Prerequisite: Student teaching or teaching experience in public schools or industry.

IT 522 Facility Planning in Industrial Education (2)

Analysis of major factors in planning and designing industrial education laboratories and related areas. Includes State standards, equipment specifications, and presentation displays. 2 activities. Prerequisite: Student teaching or instructor approval.

IT 527 Trends and Issues in Industrial Education (3)

Guided study and discussions of current and innovative practices in industrial education. Identification of major issues facing the industrial educator. Development of a personal philosophy of industrial education. 3 lectures. Prerequisite: Graduate standing or consent of instructor.

IT 580 Graduate Seminar in Industrial Education (3)

Advanced study and analysis of selected topics and problems in industrial education. 3 meetings. Prerequisite: IT 463 or instructor's approval.

IT 599 Industrial Education Thesis or Project (5)

Each student will propose, develop and complete a thesis or project involving individual research that is significant to the field of industrial education. Prerequisite: Acceptable academic standing in the master's program in Industrial Arts and consent of the instructor.

JOURNALISM

Jour 118 Mass Media and Society (3)

Examination of the mass media, their methods, purposes, and functions. Responsibilities of communication agencies, importance of media in modern society. 3 lectures.

Jour 201 Mass Media History (3)

Survey of historical and current influences in the development of today's journalism media. 3 lectures.

Jour 203 Reporting (4)

Techniques of reporting and writing news events for the press. Intensive practice in gathering, evaluating, and writing the basic news story. Special reporting techniques, in-depth investigation, interpretative reporting. 4 lectures.

Jour 221 Basic Photography (3)

Fundamental techniques in black and white photography. Mechanics of cameras and equipment, optics, composition, filters, subject content, developing, printing, and mounting. Understanding photographic principles, producing a quality print, print presentation. 2 lectures, 1 laboratory.

Jour 233 Editing and Copy Desk (3)

Copy desk work: rewriting, editing, and headlining news copy, cropping and captioning news photos. 1 lecture, 2 two-hour laboratories. Prerequisite: Jour 202

Jour 241 Journalism Practice—Magazine (2)

Credit arranged for students holding positions on magazine publications. 2 laboratories. Total credit limited to 6 units.

Jour 251 Journalism Practice—Reporting and Editing (2)

Credit arranged for students holding editorial or other positions on college publications or securing other similar supervised experience. 2 laboratories. Prerequisite: Journalism major or instructor's permission. Total credit limited to 6 units.

Jour 254 Photo Practice (2)

Supervised practice in covering deadline news assignments with still photography for college publications and public relations. Total credit limited to 6 units. 2 laboratories. Prerequisite: Jour 221

Jour 302 Feature Writing (3)

Feature writing techniques. Study of markets for nonfiction articles; practice in gathering material and preparation of articles for technical and trade journals, and other media. 3 lectures. Prerequisite: Consent of instructor.

Jour 304 Reporting II (3)

Additional experience on advanced level in campus community news coverage with special attention to public affairs reporting. Frequent off-campus reporting assignments in areas of government affairs. 1 lecture, 2 two-hour laboratories. Prerequisite: Jour 203

Jour 322 Advanced Photography (3)

Advanced black and white photograph. Use of large and small format cameras, sensitometry, lighting, transparencies, retouching, copying, visual interpretation and communication of facts and ideas. 2 lectures, 1 laboratory. Prerequisite: Jour 221

Jour 323 Photojournalism (3)

Theory of photojournalism. The photograph as a visual statement of fact. Value of the photograph in communication of news in newspapers and magazines. Photographic news assignments. Techniques in developing news picture essays. 2 lectures, 1 laboratory. Prerequisite: Jour 322

Jour 326 Broadcast Announcing (3)

Radio and television announcing in music, sports, special events, commercial talk shows, commentary, and narration. Prepares student for third class FCC operator's license. 1 lecture, 2 laboratories. Prerequisite: Sp 200

Jour 333 Broadcast Media I (3)

Writing, taping, videotaping, motion picture news, interviewing, news production for radio and television. 1 lecture, 1 laboratory, and assigned field work. Prerequisite: Jour 118, 202, or permission of instructor.

Jour 334 Advanced Copy Editing (3)

Daily experience and responsibilities in editing and rewriting news and feature stories, and editorial writing for campus news media. Practical application of headline writing and page makeup principles. 1 lecture, 2 two-hour laboratories. Prerequisite: Jour 202, 233

Jour 341 Broadcast Media Practice (2)

Credit arranged for students holding positions on college radio or closed circuit television news operations or other similar supervised experience. 2 laboratories. Total credit limited to 6 units. Prerequisite: Journalism major or permission of instructor.

Jour 351 Journalism Practice—Advertising (2)

Credit arranged for students holding advertising or other positions on college publications or securing other similar supervised experience. 2 laboratories. Total credit limited to 6 units.

Jour 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

Jour 401 International Press (3)

Global communications facilities and operations; world transmission of information; survey of world wire services and international print and broadcast news media. Analysis of press operations under varying government ideologies. 3 lectures. Prerequisite: Junior standing.

Jour 402 Mass Media Law (3)

State and federal laws affecting all communications media, hazards of libel and what defenses are recognized; contempt of court, right of privacy; study of postal regulations, regulations in advertising, broadcasting, photography, and business regulatory statutes; ethics and responsibility of the press and broadcast media. 3 lectures.

Jour 405 Publicity Methods (3)

Study and application of publicity planning and methods used by business firms, associations and similar groups. 2 lectures, 1 two-hour laboratory. Prerequisite: Jour 302

Jour 412 Public Relations (3)

Introduction to theory and practice of public relations; methods employed in dissemination of public information by various organizations. 3 lectures.

Jour 413 Advanced Public Relations (3)

Methods employed in dissemination of public information by organizations. Survey of media, case histories, formation and measurement of public opinion. 3 lectures. Prerequisite: Jour 412

Jour 421 Mass Media Advertising (3)

Theory of advertising, advertising psychology, salesmanship, copy layout and production for print and broadcast media. 2 lectures, 1 laboratory. Prerequisite: Junior standing or permission of instructor.

Journalism

Jour 425 Advertising Layout and Copywriting (2)

Study of advertising typography and illustration, application of production processes in making of layouts and writing of copy. Emphasis on local newspaper and trade magazine advertising. 1 lecture, 1 two-hour laboratory. Prerequisite: Jour 421

Jour 427 Magazine Production (3)

Organization, editing and production of magazines, with special emphasis on trade, association and company publications. 2 lectures, 1 two-hour laboratory. Prerequisite: Jour 302

Jour 428 Color Photography (3)

Fundamental techniques in color photography. Theory of color, exposing and processing color transparencies and color negatives. Color printing, finishing, and mounting. 2 lectures, 1 laboratory. Prerequisite: Jour 322



Jour 432 Broadcast Media II (3)

Feature writing, documentaries, special events, spot continuity, and discussion shows for radio and television. 2 lectures, 1 two-hour laboratory. Prerequisite: Jour 333 or permission of instructor.

Jour 433 Documentary Films (3)

Basic techniques in visual communication using the motion picture medium. Cameras, film, film processing, and editing. Filming of current news events for TV use and as documentary film. Script writing and directing. 2 lectures, 1 laboratory. Prerequisite: Jour 322, 323, 428

Jour 438 Creative Feature Photography (4)

Use of basic and advanced techniques in achievement of creative effects through self-expression. Techniques include high contrast, solarization, bas-relief, texture screens. Both black and white, and color may be used. 3 lectures, 1 laboratory. Prerequisite: Jour 428

Jour 444 Media Internship (9)

Application of techniques on daily basis with area media under supervision of department faculty. Discussion of significant political, economic, and social developments. Students' relationship with media. 2 meetings. Prerequisite: Senior standing in Journalism.

Jour 460 Senior Project (3)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 90 hours total time.

Jour 502 Supervision of School Publications (3)

Types of school publications with emphasis on student publications including the newspaper and yearbook; methods for organizing and supervising staff; production; integrating publication into the public relations picture; financing. 1 lecture, 2 laboratories. Prerequisite: Consent of instructor.

LANDSCAPE ARCHITECTURE

LA 317 History of Landscape Architecture (3)

Historical evaluation of man's interaction with outdoor space. Analysis of influences that direct, perpetuate, and form the landscape. 3 lectures. Prerequisite: Engl 105

LA 341, 342, 343 Landscape Practice (2) (2) (2)

Theory and application of working drawings, specification, cost estimation, codes, regulations, and contractual agreements. Landscape architecture practice as a profession. 2 laboratories. Concurrent: LA 351, 352, 353

LA 351, 352, 353 Design for Landscape Architects (5) (5) (5)

Development of creative abilities for solving landscape problems. Emphasis on logical analysis and application of design skills. 5 laboratories. Prerequisite: EDes 101, 110, 112, 203. Concurrent: LA 341, 342, 343 and OH 431, 432, 433

LA 451, 452, 453 Design for Landscape Architects (5) (5) (5)

Continuation of LA 353 emphasizing individual initiative and responsibility in solving problems of increased complexity. 5 laboratories. Prerequisite: LA 343, 353, AE 337

LA 461, 462 Senior Project (2) (2)

Selection and completion of a comprehensive project under faculty supervision. Problems to involve the student's technical and creative skills. 120 hours minimum total time. Prerequisite: LA 343, 353

LA 463 Undergraduate Seminar (2)

Discussion and seminars on problems in the practice of landscape architecture. Professional ethics. Students present organized material on subjects of interest in landscape architecture. 2 activities. Prerequisite: Senior standing.

LIBRARY

Lib 101 Library Instruction (1)

Instruction and practice in the use of the card catalog, reference books, periodical indexes, government documents, and other library materials. Development of student independence and initiative in using the library as a source of information. 1 lecture.

MANAGEMENT

Mgt 201 Principles of Management (3)

The management process involving organization, decision-making, and managerial activities fundamental to all management levels and functional areas. Application to business firms, governmental agencies, hospitals, benevolent groups, and colleges. 3 lectures.

Mgt 206 Purchasing (3)

The purchasing function as it applies primarily to manufacturers, utilities and institutions. Representative cases in each major area are studied and emphasis is given to the function of the purchasing department of the company in relation to and in cooperation with other major divisions of the enterprise. 3 lectures.

Manufacturing Processes

Mgt 302 International Business Management (3)

Application of managerial principles and concepts to foreign institutions and environment. Organization and administration of foreign operations and resolution of conflicts between domestic and international policies and practices. 3 lectures. Prerequisite: Junior standing.

Mgt 311 Industrial Management (3)

Organization and functioning of management in industry. Planning, direction, and control of the business enterprise in terms of policy formation, organizational structure, finance, sales, procurement, plant location, facilities and production processes. 3 lectures. Prerequisite: Junior standing.

Mgt 312 Operations Management (4)

Management of operations in the production enterprise and other institutions. Operating problems in a variety of organizational settings. Systems for planning, managing, and evaluating performance. Quantitative decision models for planning, supervising, and controlling human and material resources in socio-technical organizations. 4 lectures. Prerequisite: Math 221

Mgt 331 Organization Theory (3)

Concepts of power, authority, and influence; communications, delegation and decentralization, decision and planning theory; formal organization structures, group decision making, considerations of values, social issues, and future trends in organizations. 3 lectures. Prerequisite: Junior standing.

Mgt 341 Planning and Decision Theory (3)

Development of a theory of planning, including foundation for theory, process of planning, role of participants in planning, auxiliary functions. Integration into a general theory development of decision making. Behavioral aspects. 3 lectures. Prerequisite: Junior standing.

Mgt 413, 414 Business Policies and Organization (3) (3)

Simulation and analysis of policy making and administration from a general management point of view. Problem analysis, decision making process, administration and control. Case study and continuous appraisal of policies and objectives under varying conditions. Capsheaf of the core curriculum. 3 lectures. Prerequisite: FPM 342, IR 415

Mgt 418 Quantitative Methods and Controls in Business (3)

Basic principles of quantitative controls as applied to the fundamental operations of business. For the senior student who needs descriptive and operational knowledge as a background for application in business analysis and decision. 3 lectures. Prerequisite: Senior standing or consent of instructor.

MANUFACTURING PROCESSES

MP 127 Manufacturing Processes Fundamentals (2)

Survey of materials and manufacturing processes. Possibilities and limitations of these processes. Application to fabrication of industrial products. Limited experience in conventional machine tool operation and use of semiprecision measuring tools. For non-engineering majors. 1 lecture, 1 laboratory.

MP 137 Introduction to Skills (2)

Technical vocabulary, English measuring system, blueprint reading, American industrial practice, classification of industrial skills. Introduction to modern American industrial processes including machining, welding, casting, and sheet metal working. Designed for international students. 1 lecture, 1 laboratory.

MP 141 Manufacturing Processes: Turning I (1)

Uses, capabilities, and operational characteristics of lathe type machine tools. Properties and classifications of tool and work materials. Tool geometry and its relationship to the mechanics of chip formation. External and internal turning problems. Linear measurements in quality control. 1 laboratory.

MP 142 Manufacturing Processes: Milling I (1)

Uses, capabilities, and operational characteristics of milling type machine tools. Plane surfacing problems, measurement of relative angular attitudes. Standard classification of tool types. Tool geometry of the rotational tool and its effect on the physics of metal cutting. Surface measurements in quality control. 1 laboratory.

MP 143 Manufacturing Processes (1)

Relationships between engineering design and production fabrication. Hole forming by punching, piercing, and non-traditional methods; forming and assembling of gage metal components; physical characteristics of commonly used metals; engineering and economic significance of various production techniques. 1 laboratory.

MP 144 Manufacturing Processes: Turning-Milling (2)

Combination of MP 141 and MP 142 allows students to complete two units of manufacturing processes with one instructor in one quarter. 2 laboratories.

MP 145 Manufacturing Processes (2)

Fundamentals of drilling machine operation, tool classification. Basic layout. Hole forming. Physical properties of metals used in gage metal fabrication processes. A combination of MP 143 and 151 allows students to complete two units of manufacturing processes in one quarter with one instructor. 2 laboratories.

MP 151 Drilling Technology (1)

Fundamentals of drilling machine operation, tool classification, selection and sharpening, use of hand tools, basic layout procedures. Physical properties of metals. For non-Engineering majors. 1 laboratory.

MP 153 Manufacturing Processes: Turning II (1)

Advanced problems of lathe type machine tools, both manually and automatically controlled. Evaluation of cutting tool performance and material machinability by use of the strain gage tool dynamometer. American Standard Association charts, data, and material classifications. Optical instrumentation for quality control. 1 laboratory. Prerequisite: MP 141

MP 154 Manufacturing Processes Milling II (1)

Advanced operations on milling machines. Application of milling machine accessories, fixtures and attachments. Increased emphasis on quality control. Drilling machine, metal cutting band saw, and hobbing mill. 1 laboratory. Prerequisite: MP 142

MP 155 Manufacturing Processes: Grinding (1)

Survey of abrasive machining and finishing. Selection and care of grinding wheels. Fundamental principles, use, capabilities, operational characteristics and safety standards employed in abrasive machining and finishing. 1 laboratory. Prerequisite: MP 153, 154

MP 224 Advanced Turning (3)

Theory and operational problems of manual and automatic lathe type machine tools. Evaluation of cutting tool geometry, tool performance, and material machinability. American Standard Association Charts, data and material classification. Optical and lineal instrumentation for quality control. 2 lectures, 1 laboratory. Prerequisite: MP 141, 151

MP 225 Abrasive Machining and Finishing (2)

History and manufacture of grinding wheels, their selection and care. Fundamental principles, uses, capabilities, and operational characteristics employed in abrasive machining and finishing. Characteristics of grinder fluids. Safety standards, fixturing, and mounting of magnetic and nonmagnetic materials. 1 lecture, 1 laboratory. Prerequisite: MP 224, 154

MP 226 Advanced Machining Processes (3)

Theory and operation of machining exotic materials, using conventional electrical, chemical, and high energy methods. 2 lectures, 1 laboratory. Prerequisite: MP 225

Maricultural Engineering/Marketing

MP 240 Additional Engineering Laboratory (1-2)

Advanced production and toolroom problems. Design and construction of laboratory tooling and instrumentation. Individual and group investigation of selected problems. Total credit limited to 4 units, not more than 2 units per quarter. 1 or 2 laboratories. Prerequisite: MP 155 or consent of instructor.

MP 243 Electronic Assembly Techniques (1)

Fabricating electronics and electrical units. Soldering techniques, production soldering. Printed circuit techniques, electrical connectors, cabling processes, and component assembly. 1 laboratory. Prerequisite: MP 143, Weld 151

MP 321, 322, 323 Tool Design (3) (3) (3)

Design of manufacturing tools such as jigs, fixtures, and dies. Material selection, tolerance balancing, and quality control requirements as economic design factors. Field trips to manufacturing centers. 2 lectures, 1 laboratory. Prerequisite: MP 226, ET 344 or permission of instructor.

MP 327 Tool Design (3)

Design of such special tools as jigs, fixtures, and punch press tools. Tooling for welding and mechanized agricultural applications. Material selection. Field trip to manufacturing center. 2 lectures, 1 laboratory. Prerequisite: MP 142 or ET 151

MP 336 Direct Numerical Controlled Machining (2)

Program preparation languages for computers. Application concepts of linear and circular interpolation of 3, 4 and 5 axis machine tools. 1 lecture, 1 laboratory. Prerequisite: IE 233, Engr 251

MP 434, 435, 436 Tool and Manufacturing Engineering (4) (4) (4)

Construction and testing of jigs, fixtures, dies, and special tools for production. Design, engineering, and economical application of conventional and specialized machine tools. Field trips to manufacturing centers. 2 lectures, 2 laboratories. Prerequisite: MP 323

MARICULTURAL ENGINEERING

MarE 222 Survey of Maricultural Engineering (4)

Engineering practices in the search, capture, planting, cultivation, harvest and handling of marine food and fiber sources. 3 lectures, 1 laboratory.

MarE 223 Maricultural Engineering Laboratory (3)

Practical experience in mariculture marine safety and introduction to support equipment used in research and production operations. 1 lecture, 2 laboratories.

MarE 233 Marine Surveying and Topography (4)

Practical instruction in marine surveying and topography to permit the student to define locations. Surface and ocean floor drift of floating fauna and flora as affected by currents and topography. 3 lectures, 1 laboratory. Math 115 or equivalent.

MARKETING

Mktg 204 Marketing Principles (4)

Basic marketing institutions and functions they perform in the marketing process. Management of marketing functions of the business firm in the economic, socio-cultural, and political environment. Industrial and consumer markets, marketing research, physical distribution, marketing communications, and marketing management. 4 lectures. Prerequisite: Ec 201 or 211 and sophomore standing.

Mktg 301 Marketing Analysis I (4)

The environment of marketing decisions. Modern methods of marketing problem definition, investigation, and problem solving. Marketing information systems, information management, and decisionmaking. 4 lectures. Prerequisite: Ec 212, Stat 212

Mktg 302 Marketing Analysis II (4)

Quantitative and qualitative research techniques in the collection and analysis of marketing information for decisionmaking; evaluation and presentation. 4 lectures. Prerequisite: Mktg 301 or consent of instructor.

Mktg 303 Consumer Behavior (4)

Cultural, social-psychological and economic frameworks of consumer motivation, buying and consuming behavior as a guide for marketing management analysis and decisionmaking. Application of behavioral science concepts. 4 lectures. Prerequisite: Psy 202, Mktg 301, or consent of instructor.

Mktg 304 Physical Distribution (4)

Logistical systems approach to the physical movement of goods and services through time and space from original producers to ultimate consumers. Channels of distribution to industrial and consumer markets. Location analysis, packaging and packing, inventory management, loading and unloading, material handling, transportation. 4 lectures. Prerequisite: Mktg 301 or consent of instructor.

Mktg 305 Marketing Communications (4)

Application of behavioral sciences in management of marketing communications. Methods of communicating with industrial and consumer markets, suppliers, government and public organizations. Communications media available; their uses and limitations. 4 lectures. Prerequisite: Mktg 303 or consent of instructor.

Mktg 406 Marketing Management (4)

Decisionmaking applications in the planning, organizing, operating, and controlling of individual products and brands. Coordination of total marketing activities with all functional activities of the firm. 4 lectures. Prerequisite: Mktg 302 or consent of instructor.

Mktg 466 Marketing Problems Seminar (4)

Application of modern methods to the exploration and analysis of current and potential marketing trends, opportunities, and problems. 4 meetings. Prerequisite: Senior standing, Mktg 406 or consent of instructor.

MATHEMATICS

*** Math 100 Mathematics for General Education (3)**

Elementary topics in mathematics and the nature of mathematics. Intended to provide an appreciation of the aesthetic and cultural values of mathematics. For students not needing the specific mathematical skills required in scientific applications. 3 lectures.

Math 102 Agricultural Mathematics (3)

Percentage problems in soils, dairy, horticulture, poultry, feeds; discount and interest, Pearson's square, equations, formulas, linear measurements, areas, volumes, concrete, lumber and proportions. 3 lectures.

*** Math 103 Agricultural Mathematics (3)**

Use of exponents, logarithms and elementary slide rule, trigonometric functions; basic land descriptions; work, horsepower and efficiency, pressure; standard deviation. Not open to students with credit in Math 117. 3 lectures. Prerequisite: Math 102

Math 104 Slide Rule (1)

Operation of the slide rule and methods of computation used in engineering. 1 lecture. Prerequisite: Trigonometry.

* Not open to students having credit in Math 141 or equivalent.



Math 110 Finite Mathematics for General Education (3)

Symbolic logic; sets and subsets, including set operations; partitions of universal sets; permutations and combinations; elementary probability using Venn diagrams of truth sets. 3 lectures. Prerequisite: Appropriate score on the placement examination, or permission of the instructor.

*** Math 113 Algebra (3)**

Systems of integers; fractions; polynomials and factoring; linear equations and systems of linear equations; exponents and radicals. Exercises in agricultural problems. Enrollment limited to agricultural majors only. Not open to students with credit in Math 117 or Math 141. 3 lectures. Prerequisite: Appropriate score on placement examination.

*** Math 114 College Algebra (3)**

Quadratic equations; graphical functions; inequalities; exponential and logarithmic functions; progressions; applications to agricultural problems wherever applicable. This course primarily intended for agricultural majors. Not open to students with credit in Math 117 or Math 141. 3 lectures. Prerequisite: Math 113 or appropriate score on placement examination.

*** Math 115 Trigonometry for Agriculture (3)**

Trigonometric functions of acute angles and related angles; graphs, radian measure, fundamental identities, functions of two angles, applications of right and oblique triangles, and logarithmic applications. Not open to students with credit in Math 117. 3 lectures. Prerequisite: Math 114

*** Math 117 College Algebra and Trigonometry (5)**

An integrated course in college algebra and trigonometry covering function concept and symbols, rectangular co-ordinates, trigonometric functions, linear and quadratic functions, inequalities, analysis of trigonometric functions, inverse trigonometric functions, exponential and logarithmic functions, systems of equations, binomial formula, and complex numbers. 5 lectures.

* Not open to students having credit in Math 141 or equivalent.

*** Math 118 Pre-Calculus Algebra (4)**

Pre-calculus college algebra without trigonometry. Special products and factoring; exponents and radicals; partial fractions; fractional and quadratic equations; determinants; systems of equations; graphing; inequalities and absolute value; mathematical induction; binomial theorem; logarithms; complex numbers. Not open to students with credit in Math 117. 4 lectures.

*** Math 119 Analytical Trigonometry for Engineers (3)**

Rectangular and polar coordinates; trigonometric functions, fundamental identities; inverse trigonometric functions and relations; complex numbers. 3 lectures. Prerequisite: Appropriate score on placement test.

Math * 131, 132, 133 Technical Calculus (4) (4) (4)

Functions, their graphs and limits; techniques and applications of differential and integral calculus; introduction to applied differential equations. Designed principally for technology students and others interested in an applied three-quarter calculus sequence. 4 lectures. Prerequisite: Math 117, 115, or appropriate score on the entrance examination.

Math 141 Analytic Geometry and Calculus (4)

Introduction to analytic geometry and calculus. 4 lectures. Prerequisite: Math 117, Math 115, or appropriate score on the entrance examination.

Math 142 Analytic Geometry and Calculus (4)

Continuation of analytic geometry and calculus. 4 lectures. Prerequisite: Math 141

Math 143 Analytic Geometry and Calculus (4)

Continuation of analytic geometry and calculus. 4 lectures. Prerequisite: Math 142

Math 204 Mathematics of Matrices (3)

Matrices, inverses, linear systems, characteristic values, applications. 3 lectures. Prerequisite: Math 141 or permission of the instructor.

Math 210 Finite Mathematics for Business (3)

Vectors and matrices, including application of matrix theory to Markov chains; probability theory; linear programming; theory of games; absorbing Markov chains and genetics. 3 lectures. Prerequisite: Math 110

Math 221 Calculus for Business and Economics (4)

Polynomial calculus for optimization; partial derivatives, and elementary integration. 4 lectures. Prerequisite: Math 210

Math 241 Analytic Geometry and Calculus (4)

Continuation of analytic geometry and calculus. 4 lectures. Prerequisite: Math 143

Math 242 Differential Equations (4)

Introduction to differential equations. Differential operators. 4 lectures. Prerequisite: Math 241

Math 248 Methods of Proof in Mathematics (3)

Methods of proof (direct, contradiction, conditional, contraposition); examples from set theory; quantified statements and their negations; functions, indexed sets, set functions; proofs in analysis; proof by induction; equivalence and well-defined operations and functions; the axiomatic method. 3 lectures. Prerequisite: Math 241

* Not open to students having credit in Math 141 or equivalent.

Mathematics

Math 312 Linear Algebra (4)

Vector spaces, inner products, linear transformations, linear independence, matrix algebra, linear algebraic systems, determinants, eigenvalues, eigenvectors, applications. 4 lectures. Prerequisite: Math 241

Math 313 Linear Algebra (4)

Bilinear and quadratic forms, spectral decomposition, canonical forms, multilinear algebra, tensors, applications. 4 lectures. Prerequisite: Math 312

Math 318 Advanced Engineering Mathematics (4)

Theory and applications of Laplace transforms; Fourier series and transform; matrices. Not open to students with credit in Math 305. 4 lectures. Prerequisite: Math 242

Math 319 Partial Differential Equations (3)

Applications to vibrating strings, heat flow, flow of electricity, Legendre functions, Poisson equations and others. 3 lectures. Prerequisite: Math 318 or 305

Math 327 Mathematics for Elementary Teachers (3)

An introduction to the system of whole numbers, sets, number theory, and probability. Activity periods feature the laboratory approach to learning mathematics. 2 lectures, 1 activity. Prerequisite: Junior standing and three units of college mathematics.

Math 328, 329 Mathematics for Elementary Teachers (3) (3)

A continuation of the study of the number system through the real numbers; logic, geometry, measurement, functions, and statistics. 3 lectures. Prerequisite: Math 327

Math 335 Graph Theory (3)

Sets, permutations and combinations, finite graphs and digraphs, Euler paths and Hamiltonian paths, matrix representation of graph, connectedness, isomorphism, planar graphs, trees, applications. 3 lectures. Prerequisite: Junior standing.

Math 341 Theory of Numbers (3)

Properties of numbers. Euclid's Algorithm, greatest common divisor, least common multiple, indeterminate equations, prime numbers, congruences; emphasis toward the teaching of secondary mathematics. 3 lectures. Prerequisite: At least junior standing and Math 141

Math 381, 382 Modern Algebra (4) (4)

Fundamental algebraic structures and types of algebras, including operations within them and relations among them. Groups, rings and fields. 4 lectures. Prerequisite: Math 248

Math 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of the department head.

Math 403 Secondary School Mathematics (5)

A study of the mathematical content of secondary school courses, with particular emphasis on the new curricular materials that have been introduced into the secondary school courses. 5 lectures. Prerequisite: At least junior standing.

Math 404 Vector Analysis (4)

Algebra of free vectors with applications. Differential and integral calculus of vectors. Development of theory and application of vector operators. Green's Theorem, Stokes' Theorem, and the Divergence Theorem. 4 lectures. Prerequisite: Math 242

Math 408 Functions of a Complex Variable (4)

Elementary analytic functions and mapping; Cauchy's Integral Theorem; Theory of residues and evaluation of integrals; harmonic functions and potential theory; fluid flow. 4 lectures. Prerequisite: Math 242, 248

Math 409 Complex Analysis (3)

Further development of analytic function theory. Additional topics in calculus of residues and mapping. 3 lectures. Prerequisite: Math 408, 412

Math 410 Special Functions (3)

Analytical investigation, in the complex plane, of various transcendental functions: Gamma, Zeta, Bessel, Legendre, hypergeometric, elliptic and Theta functions. 3 lectures. Prerequisite: Math 409

Math 412 Advanced Calculus (3)

Real numbers system, Dedekind cuts, sequences, limits, continuity, derivatives and differentials, Riemann integration. 3 lectures. Prerequisite: Math 248

Math 413 Advanced Calculus (3)

Functions of several variables and partial differentiation, uniform continuity, theory of integration. Stieltjes integrals, infinite series, sequences of functions and uniform convergence. 3 lectures. Prerequisite: Math 412

Math 414 Advanced Calculus (3)

Continuation of advanced calculus topics including power series, double and triple integrals, and improper integrals. 3 lectures. Prerequisite: Math 413

Math 435 Teaching Mathematics in the Elementary School (3)

Development of mathematical concepts; the discovery or laboratory approach to learning and the role of manipulative or visual materials; teaching the mathematical rationale of the fundamental operations with the rational numbers; necessity for a sequential and organized program; the newer curricular materials and their place in the total program; problem solving; evaluation. 3 lectures. Prerequisite: Ed 304 and Math 327 or permission of the instructor.

Math 442 College Geometry (3)

Modern development of the basic concepts of plane and solid Euclidean geometry including a coordinate treatment; selected topics in advanced Euclidean geometry. 3 lectures. Prerequisite: Junior standing.

Math 443 Non-Euclidean Geometry (3)

Review of attempts to prove Euclid's fifth postulate as a point of departure in the discovery of non-Euclidean geometry; building an axiom system free of intuitive prejudice; hyperbolic plane trigonometry. Particularly appropriate for the prospective or in-service teacher. 3 lectures. Prerequisite: Math 442

Math 444 Projective Geometry (3)

Geometric and algebraic treatment of such topics as primitive forms, ideal elements, incidence and duality. Certain geometric properties preserved by projections; and construction of special figures. 3 lectures. Prerequisite: Junior standing. Math 442 recommended.

Math 456 Fundamental Concepts of Analysis (3)

Metric spaces with careful definitions of types of limits, properties of continuous functions; various aspects of differentiation; integrals defined in terms of step functions, properties extended to integrals of bounded functions in general. 3 lectures. Not open to students with credit in Math 412. Prerequisite: Math 381 and Math 241

Math 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

Mathematics

Math 463 Undergraduate Seminar (2)

Reports and discussions by students, through seminar methods, of their senior projects, as well as other topics of mathematical interest; discussions by students of curricular relevance to their needs and interest. 2 activity periods.

Math 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

Math 505, 506 Foundations of Mathematics (3) (3)

Development of the primitive materials and concepts necessary to an understanding of the axiomatic method dealing with sets, logic and algebraic theory. 3 lectures. Prerequisite: Math 381 and graduate standing.

Math 507 Structure of Geometry (3)

Transformations and geometries; affine, topological and analytic. Appropriate for the prospective or in-service teacher. 3 lectures. Prerequisite: Graduate standing or consent of the instructor; Math 442 recommended.

Math 508 Introduction to Topology (3)

Basic ideas of topology from intuitive and set-theoretic standpoint. Appropriate for the prospective or in-service teacher. 3 lectures. Prerequisite: Graduate standing or consent of the instructor.

Math 509 History of Mathematics (3)

A study of men, concepts and techniques prominent in the evolution of mathematics from earliest times to the present. Appropriate for prospective and in-service teachers. 3 lectures. Prerequisite: Graduate standing or consent of the instructor.

Math 510, 511 Survey of Modern Mathematics (3) (3)

Selected topics from the field of modern mathematics: projective, and synthetic geometry, topology, logic, matrices, vectors, theory of games, probability, linear and modern algebra and convex sets, Boolean algebras, graph theory, Lattice theory geometry of complex numbers. 3 lectures. Prerequisite: Graduate standing or instructor's approval.

Math 512, 513 Partial Differential Equations of Physical Systems (3) (3)

Partial differential equations of first and second order. Laplace's equation, wave equation, diffusion equation, and others; methods for their analytical solution. 3 lectures. Prerequisite: Math 318 or 305 and graduate standing.

Math 514 Approximations, Metric Spaces and Linear Analysis (3)

Function spaces. Approximation and metric spaces. Contraction mappings and applications, inner product and normed linear spaces. Hilbert spaces and mean square approximations. Complete orthonormal systems and applications. Linear operators and eigenvalue expansions. 3 lectures. Prerequisite: Math 313, 409, 413 or instructor approval.

Math 515 Real Analysis (3)

Introduction to Lebesgue measure and integration, convergence theorems, L_p spaces, Radon-Nikodym theorem, and Fubini's theorem. 3 lectures. Prerequisite: Math 514 or instructor approval.

Math 516 Linear Operators (3)

Linear spaces, operator theory, and operational calculus. Applications to differential equations, integral equations, transforms, and Fourier analysis. 3 lectures. Prerequisite: Math 313, 319, 412 and graduate standing.

Math 518 Advanced Ordinary Differential Equations (3)

Existence, continuation and dependence on parameters of solutions. Linear systems, initial and boundary value problems. Self-adjoint eigenvalue problems. 3 lectures. Prerequisite: instructor approval.

Math 521 Curriculum and Methods in Mathematics (3)

General aims, objectives and methods of effective teaching of mathematics in the secondary schools. The traditional secondary curriculum will be compared with new trends and developments. 3 lectures. Prerequisite: Graduate standing.

Math 531 Applied Modern Algebra (3)

Theory of algebraic structures such as groups, monoids, graphs, Boolean algebras, lattices, rings, and fields. Applications in such areas as crystallography and molecular symmetry, optimization procedures, coding for information transmission, and automata theory. 3 lectures. Prerequisite: Math 382 or consent of instructor.

Math 540 Foundations for Quantitative Methods (4)

Intensive foundation course for the MBA program. Elements of finite and linear mathematics, probability theory, and introduction to calculus. Emphasis upon model building and decision making in business and economics. 4 lectures. Prerequisite: Graduate standing.

Math 580 Seminar (1-2-3)

Built around topics in advanced mathematics chosen according to the common interests and needs of the students enrolled. Each seminar will have a subtitle according to the nature of the content. 1, 2, or 3 lectures. Total credit limited to 6 units. Prerequisite: Graduate standing and consent of instructor.

Math 593 Seminar in Applied Mathematics (3)

Topics based on the interests and backgrounds of the students. Applications of mathematics to problems in engineering and science. 3 meetings. Prerequisite: Graduate standing and consent of instructor.

Math 596 Thesis (3) (3)

Serious research endeavor devoted to the development, pedagogy or learning of mathematics. Prerequisite: Graduate standing and consent of instructor.

MECHANICAL ENGINEERING

ME 134 Mechanical Systems (4)

Analysis, synthesis, and testing of mechanical systems, their components and instruments. 2 lectures, 2 laboratories.

ME 136 Thermal Systems (3)

Analysis, synthesis and testing of thermal systems, their components and instruments. 2 lectures, 1 activity. Corequisite: ME 146

ME 146 Thermal Systems Laboratory (1)

Testing of thermal systems, their components and instruments. 1 laboratory. Corequisite: ME 136

ME 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

ME 205 Statics (3)

Statics by scalar methods. Includes forces, couples, resultants, equilibrium, trusses, cables, friction, centroids, and moments of inertia. For Engineering Technology students. 3 lectures. Prerequisite: Phys 121, Math 132, or Phys 131, Math 142

ME 206 Dynamics (4)

Dynamics by scalar methods. Includes kinematics (both absolute and relative motion of particle and bodies) and kinetics, force, mass, acceleration, work and energy, and impulse and momentum. For Engineering Technology students. 4 lectures. Prerequisite: ME 205 or ME 211

Mechanical Engineering

ME 211 Engineering Mechanics (3)

Analysis of forces on engineering structures in equilibrium. Properties of forces, moments, couples, and resultants. Equilibrium conditions, friction, centroids, area moments of inertia. Introduction to mathematical modeling and problem solving. Vector mathematics where appropriate. 3 lectures. Prerequisite: Math 143 (or concurrently), Phys 131

ME 212 Engineering Mechanics (4)

Analysis of motions of particles and rigid bodies encountered in engineering. Velocity, acceleration, relative motion, work, energy, impulse, and momentum. Further development of mathematical modeling and problem solving. Vector mathematics where appropriate. 4 lectures. Prerequisite: Math 241 (or concurrently), ME 211

ME 234 Mechanical Engineering Systems (4)

Analysis, synthesis and testing of mechanical and thermal systems, their components and instruments. For qualified transfer students. 3 lectures, 1 laboratory. Prerequisite: Approval of department head.

ME 240 Additional Engineering Laboratory (1-2)

Total credit limited to 4 units, with not more than 2 units in any one quarter. 1 or 2 laboratories.

ME 301 Thermodynamics (4)

Fundamental concepts of work, heat, and energy. First and second laws of thermodynamics. Properties of ideal gases and vapors. Combustion. Vapor and gas power cycles. For Engineering Technology students. 4 lectures. Prerequisite: Math 133, Phys 122, Chem 121

ME 302, 303 Thermodynamics (3) (3)

First and second laws of thermodynamics, processes, properties. Psychrometry, vapor cycles, air cycles and combustion theory. 3 lectures. Prerequisite: Chem 125, Phys 132, Math 143

ME 310 Nuclear Reactor Engineering I (4)

Introduction to nuclear energy, reactor physics, basic power plant design and operation. Radioactivity experiments and analog simulation methods. 3 lectures, 1 laboratory. Prerequisite: Chem 125

ME 311 Fluid Mechanics (3)

Basic principles of fluid flow. Fluid statics, kinematics of fluid flow, momentum equation, viscosity, and fluid friction. Incompressible flow in pipes, flow measurement, flow machinery, and lubrication. For Engineering Technology students. 3 lectures. Prerequisite: Phys 122, ME 206 or 212

ME 316 Mechanical Vibrations (3)

Free vibration, damping, transient and steady state response to forced vibrations. Engineering methods, single and multiple degrees of freedom. 3 lectures. Prerequisite: Math 318, ME 212

ME 317 Vibrations Laboratory (1)

Experimental studies of the dynamic behavior of structures and machines. Instrumentation methods utilized in field and laboratory. Analog techniques. 1 laboratory. Concurrent: ME 316

ME 324 Kinematics (4)

The study of motion in machine parts. Displacements, velocities, and accelerations in linkage, cams, gears, and other mechanisms. 2 lectures, 2 two-hour laboratories. Prerequisite: ET 141, ME 212

ME 327 Introduction to Design (5)

Design of machine parts by stress and deflection. Effects of fluctuating stresses and stress concentration. Design of gears, clutches, brakes, bearings, shaft and other machine parts. Modern industrial design practice using standard components and design layout drawings. 4 lectures, 1 laboratory. Prerequisite: Aero 207, Aero 229 (or concurrent), ET 141, Met 306

ME 341, 342 Fluid Mechanics (3) (5)

Fluid statics. Conservation equations of fluid dynamics. Viscous flow, boundary layer concepts, lift and drag, compressible flow, turbomachinery. ME 341: 3 lectures. Prerequisite: ME 212. ME 342: 4 lectures, 1 laboratory. Prerequisite: ME 341, Engr 251

ME 343 Thermodynamics Laboratory (1)

Experimental methods applied to the evaluation of machine performance, processes and verification of theory. Thermodynamic processes, heat transfer characteristics, and combustion phenomena. Planning experiments, interpretation of results, preparation of reports. 1 laboratory. Prerequisite: ME 303, EnvE 313

ME 349 Advanced Materials Testing Laboratory (1)

Advanced laboratory work in testing of materials and structures. Column and beam tests, fatigue tests, static and dynamic experimental stress analysis techniques with electric resistance strain gages and brittle lacquer coatings. 1 laboratory. Prerequisite: Aero 229

ME 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ME 401, 402 Stress Analysis (4) (4)

Finite-element stress analysis, computer programs, elasticity. Beams, shrink fits, thick walled pipes, torsion, stress concentrations. Experimental stress analysis. 3 lectures, 1 laboratory. Prerequisite: Aero 207, Math 318, Engr 251

ME 411 Nuclear Reactor Engineering II (4)

Reactor thermal and hydraulic design. Heat transfer in and from reactor elements. Pressure drop and heat transfer in two-phase flow. 4 lectures. Prerequisite: ME 341, EnvE 313, Chem 125

ME 412 Nuclear Reactor Engineering III (4)

Advanced thermal and fast type nuclear power plants; engineering design and operational characteristics, safety analysis and environmental considerations. Operational experiments with training-type nuclear reactor. 3 lectures, 1 laboratory. Prerequisite: ME 411, Phys 421

ME 417 Advanced Vibrations (4)

Vibration of complex engineering systems. Inertia and stiffness matrices. Natural frequencies and normal modes. Approximate solutions and computer techniques. Response to transient and periodic inputs. 3 lectures, 1 laboratory. Prerequisite: ME 316, Engr 251

ME 422 Mechanical Control Systems (4)

Analytical modeling and compensation of mechanical control systems. Design of mechanical, hydraulic and fluid systems using analog and digital simulation techniques. 3 lectures, 1 laboratory. Prerequisite: ME 316

ME 423 Elements of Machine Design (4)

Fundamentals of machine design for engineering students other than mechanical. Stresses and deflections in machine parts. Engineering materials. Design of springs, bearings, gears, chains, belts, clutches and brakes. Course is oriented to stress philosophy of design, application and comparative advantage rather than basic design. 3 lectures, 1 laboratory. Prerequisite: Aero 207, or equivalent, Math 241, ME 212

Mechanical Engineering

ME 424, 425 Design of Piping Systems (4) (4)

Functions, requirements, and design of piping systems, including safety and economic considerations for power, chemical, and process plants. Welding and other forms of joint construction, materials specifications, sizing, layout, flexibility, support, insulation, and cost estimation of water, steam, air, gas, and corrosive and viscous fluid systems. Philosophy, background, and requirements of principal governing National Codes. 3 lectures, 1 laboratory. Prerequisite: Aero 207, ME 341, Engr 251

ME 426 Engineering Analysis of Dynamic Systems (4)

Lagrangian mechanics. Studies of advanced problems in the kinematics and kinetics of engineering systems. 4 lectures. Prerequisite: ME 316, Engr 251

ME 428 Design (4)

Basic design techniques such as brainstorming, feasibility studies, models, case studies, design decisions and compromises. Industrial participation design program. 2 lectures, 2 laboratories. Prerequisite: ME 327, Engr 251

ME 431 Mechanical Design Technique (4)

Comprehensive study of design methods. Design factors, including market value, producibility, servicability, utility, style. Analysis of useful ideas and their integration into a practical design in the form of an engineering layout drawing. 2 lectures, 2 laboratories. Prerequisite: ME 317, 324, 428

ME 435 Petroleum Production Development (4)

Theory and practice of oilwell planning, drilling and completion applied to the development of new oil production. Planning and operation of offshore deep water drilling systems. 4 lectures. Prerequisite: ME 327

ME 436 Petroleum Reservoir Engineering (4)

Reservoir mechanics of primary depletion and secondary recovery operations. Techniques for realizing maximum ultimate recovery. 4 lectures. Prerequisite, ME 341

ME 441 Advanced Thermodynamics (4)

Maxwell relations, clapeyron equation, activity, activity coefficient, and fugacity. Phase and chemical equilibrium. Selected modern applications of thermodynamics. 4 lectures. Prerequisite: ME 303

ME 442 Dynamics and Thermodynamics of Compressible Flow (4)

Control volume analysis of fluid-thermo equations for one dimensional, compressible flow involving area change, normal shocks, friction, and heat transfer. Two-dimensional supersonic flow including linearization, method of characteristics, and oblique shocks. One-dimensional constant area, unsteady flow. 4 lectures. Prerequisite: Math 242, ME 303, 342

ME 443 Turbomachinery (4)

Performance characteristics. Two-dimensional cascades. Axial flow turbines. Axial flow compressors, pumps and fans. Three-dimensional flows in axial turbomachines. Centrifugal pumps, fans and compressors. 4 lectures. Prerequisite: ME 303, 342, Math 318

ME 444 Combustion Engine Design (4)

Application of design parameters to the various engine cycles. Aspects of the combustion processes. Energy conversion including losses and cooling. Static and dynamic loading. 3 lectures, 1 laboratory. Prerequisite: ME 303

ME 445 Convective Heat and Mass Transfer (4)

Forced convection in laminar and turbulent flow, free convection, diffusion, combined heat and mass transfer. 4 lectures. Prerequisite: ME 341, EnvE 313

ME 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time. Prerequisite: Senior standing.

ME 463 Undergraduate Seminar (2)

New developments, policies, practices, and procedures are discussed through regular seminar. Each individual is responsible for the development and presentation of a topic in his chosen field. 2 meetings. Prerequisite: Senior standing.

ME 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

METALLURGICAL ENGINEERING

Met 121 Introduction to Metallurgical Engineering (2)

Nature and identification of metals and non-metals, production, joining and working processes. Selection for specific purposes. Macro and micro etching and preparation of metallographic specimens. Metallurgical engineering reports, calculations associated with engineering. 1 lecture, 1 laboratory.

Met 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

Met 222 Physical Metallurgy (4)

Lattice structures, cooling curves, alloy systems. Mechanical test methods, strength, ductility, modules of elasticity. Heat treatment, isothermal transformation diagrams, complex alloy systems. Application of principles for selection of metals for corrosion resistance. Other engineering materials, including ceramics. 3 lectures. 1 laboratory.

Met 223 Nonferrous Alloys (2)

Basic theory of major alloy systems involving nonferrous metals, such as aluminum, titanium and copper. Emphasis on phase relations, mechanical properties, processing and procurement. 1 lecture, 1 laboratory. Prerequisite: Met 222

Met 235 Metallurgy for Engineering Technology (4)

Physical and mechanical properties of metallic parts. Selection, heat treatment, and use of metals and alloys. Steel, cast iron, stainless steel, and non-ferrous alloys. Fabrication problems and their solution. 3 lectures, 1 laboratory. Prerequisite: Junior standing in Engineering Technology.

Met 240 Additional Metallurgy Laboratory (1-2)

Total credit limited to 4 units, with not more than 2 units in any one quarter. 1 or 2 laboratories.

Met 254 Elements of Welded Structures (2)

Cost estimating of steel fabrications. Basic strength of materials as related to machinery structural sections. Strength of welded joints. Design of fabricated machinery. Principally for Agricultural majors. 1 lecture, 1 laboratory. Prerequisite: Weld 156

Met 301, 302, 303 Theory of Materials (4) (4) (4)

Fundamentals of material science; concepts and problems relating structure of metals to their behavior in use. Uniaxial and complex static stresses; effects of temperature and rate of loading; elastic and plastic deformation; electrical, magnetic, and thermal behavior; fatigue and creep. 3 lectures, 1 laboratory. Prerequisite: Math 241, Phys 133, ME 211, Chem 125; Engr 251, or consent of instructor.

Metallurgical Engineering

Met 306 Materials Engineering (3)

Structure of matter. Physical and mechanical properties of materials including metals, alloys, ceramics, insulating materials, semi conductors, polymers and glass. Equilibrium diagrams. Heat treatments, corrosion and protective coatings. 3 lectures. Prerequisite: Sophomore standing in major, Physics 132, Chem 124 or instructor's permission.

Met 309 Survey of Corrosion (2)

Principles of corrosion control, the eight forms of corrosion, materials testing, compatibility, role of metallic structure, environment and surface conditions, protective coatings, economics of corrosion, field trips to corrosion laboratories. 2 lectures. Prerequisite: Junior standing, Chem 122 or 125, Phys 133

Met 324, 325, 326 Metallurgical Engineering (4) (4) (4)

Extractive metallurgy, steel mill and foundry theory and practice, metal fabrication processes. Heat treatment, atmosphere furnaces, bright annealing, carbon restoration. Welding metallurgy. Failure investigation, metallography including electron microscopy. Application of nondestructive testing, X-ray, ultrasonic. Codes and specifications. 2 lectures, 2 laboratories. Prerequisite: Met 223

Met 341 Materials Engineering Laboratory (1)

Laboratory experiments with materials. Heat treating, steel and aluminum identification of microstructure and physical and mechanical evaluation. 1 laboratory. Prerequisite or concurrent: Met 306

Met 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

Met 414 Materials for Electronic Engineering (3)

Advanced topics concerning the physical properties of electronic materials and electronic structure, semi conductors, dielectrics, ferromagnetics, processing and fabrication, relation of properties to structures. 3 lectures. Prerequisite: Met 306, Phys 406 or 412

Met 421, 422, 423 Advanced Theory of Materials (4) (4) (4)

X-ray diffraction, theory of alloying, imperfections and dislocations, strengthening mechanisms, plastic deformation, strain-hardening, recovery and recrystallization, diffusion, solidification, fracture, creep, fatigue. Metallurgical reactions, thermodynamics of solids, physical chemistry of corrosion gas-metal interactions, corrosion control, polymers, ceramics, cermets. 4 lectures. Prerequisite: Met 303, 326, Chem 306

Met 424, 425, 426 Applied Metallurgical Engineering (4) (4) (4)

Tool and complex alloy steels, advanced metallography and photomicrography, investigation of actual service failures, creep, fatigue, corrosion, metallurgical computations, preparation of formal engineering reports. 2 lectures, 2 laboratories. Prerequisite: Met 303, 326; Chem 306

Met 434 Welding Engineering (3)

Weldability of steels and alloys and other metallurgical aspects of welded fabrication. 1 lecture, 2 laboratories. Prerequisite: Met 306

Met 435 Welding Engineering (3)

Pressure vessel design and other design problems in accordance with governing codes. Cost estimating of steel fabrication. Jig and fixture design for mass production with various welding processes. 1 lecture, 2 laboratories. Prerequisite: Met 434

Met 436 Welding Engineering (3)

Problems in quality control. Process selection and evaluation for high speed production. Process procedure qualification. 1 lecture, 2 laboratories. Prerequisite: Met 435

Met 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

Met 463 Undergraduate Seminar (2)

Preparation, oral presentation, and discussion by students of technical papers on recent engineering developments. 2 lectures. Prerequisite: Senior standing.

Met 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.



MILITARY SCIENCE

***MSc 101 (MS I) Basic Course (1)**

The nature of war and evolution of weapons and warfare; concepts of international balance of power and national power factors. 1 lecture.

***MSc 102, 103 (MS I) Basic Course (1) (1)**

American Military History from the colonial period through World War I; battles and campaigns; application of the principles of war. Classes proceed progressively. 1 lecture.

***MSc 201 (MS II) Basic Course (2)**

Principles of land navigation; military map system; techniques of orientation and navigation using maps and compass. 2 lectures.

***MSc 202 (MS II) Basic Course (2)**

Principles of leadership; principles of personnel management; case analyses in group goal attainment focusing on leader, group, and situational needs. 2 lectures.

* Students who are participants in the ROTC program are required to take for no additional academic credit one hour of field instruction in all Military Science courses.

Music

*MSc 203 (MS II) Basic Course (2)

Principles of tactics and operations; organization of small units and their employment; field orders and instructions; small units leadership techniques. 2 lectures.

*MSc 301, 303 (MS III) Advanced Course (4)(4)

Personnel management problems and techniques of motivation as applied to a military environment; techniques and methods of instruction; tactical problems and techniques adaptable to the small military organization; control measures (communications). 4 lectures.

MSc 401, 403 (MS IV) Advanced Course (4) (4)

Military combat operations; military geography; coordination and planning among elements of the military team; analysis of selected leadership and management problems involved in unit administration, military justice and the Army Readiness Program. The position of the United States in the contemporary world scene; impact on leadership and management problems in the military service. 4 lectures.

MUSIC

Mu 101 Music Theory (3)

Elements of music theory covering: notation, construction of major and minor scales and keys, signatures, intervals, diatonic triads, triad forms, inversions, transposition, study of meter and rhythm, elementary ear training. 3 lectures.

Mu 111, 112, 113 Class Piano (1) (1) (1)

Fundamentals of piano techniques, tone production, rhythm, sightreading, interpretation, style, and keyboard facility for those with little or no piano experience. Designed to meet the piano requirements for music minors. The classes proceed progressively. 1 activity.

Mu 131 Class Guitar (1)

Fundamentals of guitar technique and performance including elements of both classical and folk guitar. Designed to meet the needs of the public school teacher. No previous experience necessary. 1 activity.

Mu 141 Dance Orchestra (2)

Limited to those who have had considerable experience playing musical instruments. Students in the dance orchestra have an opportunity to play for various College entertainments, dances, community programs, radio broadcasts, and the annual spring tour and Home Concert. 2 laboratories. Total credit limited to 12 units.

Mu 144 Symphony Orchestra (1)

Open to any college student whose technique is adequate. In addition to standard repertory, the orchestra emphasizes unusual or rarely performed works. Select members of the orchestra are given additional opportunities to perform chamber music. 1 laboratory. Prerequisite: Consent of instructor. Total credit limited to 6 units.

Mu 147 Instrumental Ensembles (1)

Open to qualified musicians. Rehearsal and public performances in trios, quartets, and quintets. 1 activity. Prerequisite: permission of the instructor. Total credit limited to 12 units.

Mu 151 Band (1)

Limited to those students who have had experience with band instruments. The band plays for many college functions, assemblies, athletic games, and rallies, and makes at least one trip each year. Smaller groups are organized from the band for special functions. 1 laboratory. Total credit limited to 6 units.

* Students who are participants in the ROTC program are required to take for no additional academic credit one hour of field instruction in all Military Science courses.

Mu 154 Men's Glee Club (1-2)

Four- to eight-part vocal compositions; fundamentals of breathing, tone production, diction, and interpretation. Quartets, small groups, and soloists are developed, for which additional credit may be given. The club sponsors an annual spring tour and Home Concert. Tryouts in fall only. 1 or 2 laboratories. Total credit limited to 12 units.

Mu 155 University Singers (1)

Study and public performance of chamber music for mixed voices from the sixteenth century to the present. Total credit limited to 6 units. 1 laboratory. Prerequisite: Permission of instructor.

Mu 157 Women's Glee Club (1-2)

Choral literature for women's voices; independence and skill in part singing; care and development of the voice; choral interpretation; performances in public concerts, campus functions, and the annual Home Concert. Small groups and soloists may earn additional credit. 1 or 2 laboratories. Prerequisite: Permission of the instructor. Total credit limited to 12 units.

Mu 203 Elementary Harmony (3)

Melodic form; recognition, construction, and use of primary chords and inversions; cadences, enharmonic change, harmonization of simple melodies, and arranging for four-part strings. 3 lectures. Prerequisite: Mu 101

Mu 204, 205, 206 Appreciation (3) (3) (3)

Introduction to the elements and concepts of music, leading to greater understanding of art music. Discussion of the styles, forms, and specific composers in Western music. May be taken in any order. 3 lectures.

Mu 208 Ethnic Music of the World (3)

Contemporary concepts of ethnomusicology. Discussion of folk music of the world by geographic area. History and development of musical instruments. May be repeated to 6 units. 3 lectures.

Mu 209 Contemporary Jazz (3)

Survey of jazz from the 1930's to the present; its historical background and development in the United States. Big bands, combos, and soloists. Extensive use of recordings and live presentations. 3 lectures. Prerequisite: Junior standing or consent of instructor.

Mu 211, 212, 213 Class Piano (1) (1) (1)

Intermediate level piano techniques with emphasis on style, interpretation, sight-reading, basic performance practices, and the solution to general musical problems. The classes proceed progressively. Total credit in each course limited to 2 units. 1 activity. Prerequisite: One year of piano or equivalent.

Mu 231, 232, 233 Instruments—Theory and Performance (1) (1) (1)

Study of the fundamentals of playing and teaching woodwind, brass, string, and percussion instruments. Separate sections arranged with instructor. 1 activity.

Mu 237, 238, 239 Voice—Theory and Performance (1) (1) (1)

Study of the fundamentals of singing; breathing, posture, diction, development of voice, resonating chambers, vocal interpretation, sight singing. Theory of music as applied to voice production; notation, intervals, triad forms, meter and rhythm, major and minor scales. 1 activity.

Mu 241 Functional Keyboard (1)

For the classroom teacher. Simple accompaniments used in classroom song books, reading simple piano scores from the teacher's manual. Simple folk songs and appropriate chording. Recommended in conjunction with Mu 201. 1 activity.

Music

Mu 301 Music for Children (3)

Development of basic music proficiency; singing, conducting, playing simple instruments, accompaniment, rhythmic activities. Assumes a knowledge of music fundamentals. 3 lectures. Prerequisite: Mu 101

Mu 306 Ethnic Music of the World II (3)

Advanced study of ethnic music. May be repeated to 6 units. 3 lectures. Prerequisite: Mu 208 or permission of instructor.



Mu 307, 308, 309 Conducting (2) (2) (2)

Principles and techniques in conducting with experience in score reading. 2 lectures. Prerequisite: Mu 101 or equivalent.

Mu 311, 312, 313 Class Piano (1) (1) (1)

Designed for the advanced and semi-advanced student. Emphasis on general knowledge of piano literature, interpretation, style, and performance practices. Admittance to the class by audition. Fall quarter emphasis, Baroque keyboard literature; winter quarter, Classic; spring quarter, Romantic and Contemporary. Total credit in each course limited to 2 units. 1 activity.

Mu 331, 332, 333 Instruments (1) (1) (1)

Study of the fundamentals of playing and teaching woodwind, brass, string, and percussion instruments. Continuation of Mu 231, 232, 233. 1 activity.

Mu 337, 338, 339 Voice (1) (1) (1)

Study of the fundamentals of singing; breathing, posture, diction, development of voice, resonating chambers, vocal interpretation, sight singing. Theory of music as applied to voice production; notation, intervals, triad forms, meter and rhythm, major and minor scales. Continuation of Mu 237, 238, 239. 1 activity.

Mu 341 Dance Orchestra (2)

Limited to those who have had two years of orchestra experience. Students in the dance orchestra have an opportunity to play for various college entertainments, dances, community programs, radio broadcasts, and annual spring tour and Home Concert. 2 laboratories. Total credit limited to 12 units. Prerequisite: Two years of orchestra participation.

Mu 344 Symphony Orchestra (1)

Open to any college student whose technique is adequate. In addition to standard repertory, the orchestra emphasizes unusual or rarely performed works. Select members of the orchestra are given the additional opportunities to perform chamber music. Total credit limited to 6 units. 1 laboratory. Prerequisite: Two years of orchestra participation.

Mu 351 Band (1)

Limited to those students who have had two years of band. The band plays for many college functions, assemblies, athletic games, and rallies, and makes at least one trip each year. Smaller groups are organized from the band for special functions. Total credit limited to 6 units. 1 laboratory. Prerequisite: Two years of band participation.

Mu 354 Men's Glee Club (1-2)

Four- to eight-part vocal compositions; fundamentals of breathing, tone production, diction, and interpretation. Quartets, small groups, and soloists are developed, for which additional credit may be given. The club sponsors an annual spring tour and Home Concert. Tryouts in fall only. 1 or 2 laboratories. Total credit limited to 12 units. Prerequisite: Two years of Glee Club participation.

Mu 355 University Singers (1)

Study and public performance of chamber music for mixed voices from the sixteenth century to the present. Total credit limited to 6 units. 1 laboratory. Prerequisite: Two years of Chamber Singers participation.

Mu 357 Women's Glee Club (1-2)

Choral literature for women's voices; independence and skill in part singing; care and development of the voice; choral interpretation; performances in public concerts, campus functions, and the annual Home Concert. Small groups and soloists may earn additional credit. 1 or 2 laboratories. Total credit limited to 12 units. Prerequisite: Two years of Glee Club participation.

Mu 403 Composition in Small Forms (2)

Composition of music in the smaller forms. Students are allowed freedom in the development of a personal style. 2 lectures. Prerequisite: Mu 203 or permission of instructor.

Mu 404, 405, 406 History of Music (2) (2) (2)

Intensive study of a selected topic in music history each quarter through the use of readings, recordings, and scores. Prior completion of at least one quarter of music appreciation is recommended. 2 lectures.

Mu 407 Form and Analysis (3)

Intensive survey of musical forms from the 17th century to the 20th century. Analysis of musical structure, melodic invention and elaboration. 3 lectures. Prerequisite: Mu 101

Mu 431, 432, 433 Advanced Instruments—Theory and Performance (1) (1) (1)

Emphasis placed on the physiological and acoustical principles of tone production. Selected readings on the history and literature of each family of instruments. 1 activity.

Mu 436 Music Concepts (3)

Creative approach to history, theory, appreciation, and criticism of music. Currently employed materials in the light of new musicological findings. Development of original musical themes utilizing scalar, chordic, and pentatonic approaches. 3 lectures. Prerequisite: Mu 201 or consent of instructor.

Mu 437, 438, 439 Advanced Voice—Theory and Performance (1) (1) (1)

Selected readings in the theory of voice production. Study of many types of vocal literature. 1 activity. Prerequisite: Mu 237

NATURAL RESOURCES MANAGEMENT

NRM 101 Introduction to Natural Resources Management (3)

Natural resources of the United States: forests, minerals, water, wildland and wildlife. Development, management, and utilization of our natural resources for the continuous benefit of man and conservation of the resources. 3 lectures.

NRM 102 Forest Resources (3)

Fundamentals of forestry including basic silviculture, forest protection, and multiple use of forest lands for water production, forage, recreation, wildlife, and timber. 3 lectures.

NRM 112 Recreation Systems and Management (3)

Introduction to national, state, county, city and private park systems. History, policy and principles of the formation, administration and functioning of recreational units at the park, district and regional levels. 3 lectures.

NRM 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

NRM 206 Resource Planning (3)

Analysis and development of plans for land resource uses including survey and inventory application of multiple use principles. Projection of use demands, economic evaluations, and priority assessments. 3 lectures. Prerequisite: NRM 101 or 112

NRM 221 Lake Management (3)

Practices and management of recreational lakes to provide maximum use, to reduce aquatic pests, to provide necessary water quality, and to attract or produce aquatic animals associated with hunting and fishing preserves, farm ponds, and ornamental and recreational waters. 2 lectures, 1 laboratory. Prerequisite: NRM 101 or 112

NRM 223 Resource Survey (3)

Survey, inventory and assessment techniques used for evaluation of physical, biological and cultural resource features of a land area. Interpretation and correlation of geology, soils, topographic, climatic, vegetative and cultural maps. 2 lectures, 1 laboratory. Prerequisite: NRM 206

NRM 302 Natural Resources Policy (3)

Historical development and significance of natural resource policies including changing patterns between private and public enterprise and federal, state, and local government in resource management. 3 lectures. Prerequisite: NRM 101 or 112

NRM 305 Resource Fire Control (3)

Fire behavior and effects; prevention, and control in the chaparral, grasslands, and wooded areas of forests, parks, and wildlands; fire danger measurement; prescribed use in management; policy and objectives. 3 lectures. Prerequisite: NRM 102 or 112

NRM 312 Resource Law Enforcement (3)

Law enforcement applied to natural resource conservation. Development of laws; laws of arrest, search, and seizure; rules of evidence; court structure; and court procedures. Laws of parks, forestry, wildlife, and water quality control. 3 lectures. Prerequisite: NRM 101 or 112.

NRM 316 Silviculture (3)

Interaction of forest and chaparral plant communities within the environment; influence of external factors upon wildlands, particularly those suited to outdoor recreation and wildlife production; growth and development of individual plants; origin, development, cultural practices and tolerance of forest and chaparral plant communities. 3 lectures. Prerequisite: NRM 102

NRM 323 Ecology of Resource Areas (3)

Dynamics of environmental relationships in natural and developed resource areas, and the effects caused by man through his practices of preservation, recreation, and resource utilization. 2 lectures, 1 laboratory. Prerequisite: one quarter of life science, natural resources, or consent of instructor.

NRM 326 Environmental Interpretation (3)

Interpretation of the biological, physical and aesthetic values of the natural elements of our environment; organization and presentation of interpretive materials by oral, written, and display methods of communication. 2 lectures, 1 laboratory. Prerequisite: NRM 323 and Junior standing.

NRM 327 Dendrology (3)

Identification, classification, silvical characteristics, distribution, environmental requirements and economic importance of trees, parks, and forest and wildlife areas of the United States. Emphasis on California species. 1 lecture, 2 two-hour laboratories. Prerequisite: Bot 123

NRM 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

NRM 416 Natural Resources—Applied Economics (3)

Application of analytical economic methods to forest, marine, recreation, and wildlife resources development and utilization. Effect of time on rate of resource use; external effects of multiple uses of a common property resource; decision making involving multiple uses of a single resource system; recreation resource valuation in the absence of a market established price. 3 lectures. Prerequisite: NRM 101 or 112; Ec 211

NRM 421 Water Oriented Recreation (3)

Practices of management of water oriented outdoor recreation on private and public waters. Consideration of shoreline development, water surface time and space zoning, and underwater development. 2 lectures, 1 laboratory. Prerequisite: NRM 221

NRM 429 Site Development and Maintenance (4)

Basic planning and design principles of selected outdoor recreation sites. Area layout, facility design, construction, and maintenance of structures, grounds, roads, and trails. 3 lectures, 1 laboratory. Prerequisite: NRM 223

NRM 438 Natural Resources Administration (4)

Administration of private and public resource units, including planning, budgeting, organizing, programming, staffing and maintaining the units. 3 lectures, 1 laboratory. Prerequisite: NRM 223 and senior standing.

NRM 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

NRM 463 Undergraduate Seminar (2)

Study and oral presentation of current developments and problems in the subject field. Discussion of recent findings and research and their application. 2 lectures.

NRM 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

NRM 502 Resource Conservation (3)

Conservation developments for broad treatment of land, water, mineral, forest, range, and wildlife resources. 3 lectures. Prerequisite: Graduate status, Cons 311, and permission of department head.

ORNAMENTAL HORTICULTURE

OH 100 Orientation to Ornamental Horticulture (1)

Ornamental Horticulture as a career. Preview of the nursery, florist, and landscape industries. Discussion of student projects and project records. 1 lecture.

OH 121 Nursery and Garden Practices (4)

Commercial nursery operations, including layout, seed sowing, potting, canning, care, and sanitation. Garden practices including transplanting, staking and tying, fertilizing, irrigating, and pruning. Herbaceous and greenhouse plants, shrubs, and trees. 3 lectures, 1 laboratory.

OH 122, 126, 221 Plant Materials I, II, III (4) (4) (4)

Identification, habits of growth, cultural requirements, and use of ornamental woody and herbaceous plants used in the landscape of California. 3 lectures, 1 laboratory.

OH 123 Plant Growth Environment (4)

Survey of the floriculture industry. Analysis, description, and operation of greenhouses and other forcing structures. Relationship of light, temperature, moisture, aeration and humidity to plant growth. 3 lectures, 1 laboratory. Prerequisite: OH 121

OH 124 Landscape Drafting (2)

Drafting techniques and standards progressing from tracings to light construction working drawings. 1 lecture, 1 laboratory.

OH 125 Floral Design (4)

A study of the principles of flower arrangement and corsage making. 2 lectures, 2 laboratories.

OH 145 Bonsai Culture (2)

Study of the philosophy, history, training, culture, production, and care of the Japanese Bonsai. 1 lecture, 1 activity.

OH 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

OH 223 Principles of Landscape Design (4)

Basic principles of design related to landscape problems. 2 lectures, 2 laboratories. Prerequisite: OH 124

OH 225 Floriculture Grades and Standards (3)

Grades and standards for cut flowers, potted plants, and other ornamentals. Use of score cards in evaluating florist crops. 1 lecture, 2 laboratories. Prerequisite: OH 121

OH 227 Flower Shop Management (4)

Practices and problems in the management of the retail flower shop with emphasis upon shop layout, window display, telegraph delivery services, buying, selling, and personnel relations. 2 lectures, 2 laboratories. Prerequisite: OH 125

OH 230 Ornamental Gardening (3)

For non-horticulture majors. Information and recommendations for the home gardener. Methods of propagation, pruning, planting, soils, fertilizers, lawn planting and maintenance, pest and weed control, home landscaping, and identification and care of house plants. 2 lectures, 1 laboratory.

OH 233 Plant Propagation (4)

Principles of asexual propagation. Budding, cutting, layering, division, and separation. 3 lectures, 1 laboratory. Prerequisite: OH 123

OH 243 Turf Management (4)

Turf propagation, irrigation, fertilizer and pest control methods and procedures. Turf grass varieties and uses. Turf equipment. 3 lectures, 1 laboratory.

OH 321 Residential Landscaping (4)

Principles of landscape design for residential properties. Designing of several small home properties. 2 lectures, 2 laboratories. Prerequisite: OH 122, 221, 223

OH 322 Advanced Landscape Design (4)

Principles of landscape design of public properties and the application of these principles in solving of landscape design problems. 2 lectures, 2 laboratories. Prerequisite: OH 121, 221, 223

OH 323 Greenhouse Management (4)

Problems and practices in the management of greenhouses. Scheduling greenhouse crops, planning crop rotation, management decisions in production costs and personnel matters. 3 lectures, 1 laboratory. Prerequisite: OH 123, 325 or 334

OH 324 Tropical Plant Culture (4)

Identification, culture, propagation, and ornamental use of tropical plants. 3 lectures, 1 laboratory. Prerequisite: Junior standing and permission of instructor.

OH 325 Pot Plant Production (4)

The production of major commercial potted plants under glass and lath. Preparation for sale and merchandising of greenhouse crops. 3 lectures, 1 laboratory. Prerequisite: OH 334, SS 221

OH 327 Diseases and Pests of Ornamental Plants (4)

A detailed study of diseases and pests of ornamental plants, their effect on plants, their prevention and control. 3 lectures, 1 laboratory. Prerequisite: OH 122, Ent 126, Bot 323

OH 328 Advanced Floral Design (4)

Advanced styling of floral designs used in sympathy work; casket sprays, wreaths, hospital arrangements, and solid work. 2 lectures, 2 laboratories. Prerequisite: OH 125, 227

OH 329 Advanced Floral Design (4)

Advanced styling of floral designs to wear and carry, as practiced specifically in wedding work. 2 lectures, 2 laboratories. Prerequisite: OH 328

OH 330 Flower Arrangement (2)

Principles and uses of flower arrangements as used in home and party decorating. 1 lecture, 1 laboratory. Prerequisite: Art 321 or HE 242 or consent of instructor.

OH 331, 332 Landscape Contracting (4) (4)

Practices in supervising men and applying approved techniques in landscape construction. Cost finding and estimating for landscape trades. Contract writing, accounting systems, and legal aspects of landscape contracting. 3 lectures, 1 laboratory. Prerequisite: OH 124

OH 333 Advanced Turf Management (4)

Maintenance and operation of large areas such as golf greens, athletic fields, and park areas. Systems of management and maintenance, business aspects, and turf industry. 3 lectures, 1 laboratory. Prerequisite: OH 243 or equivalent.

OH 334 Cut Flower Production (4)

The production of cut flowers in the field, under cloth, and under glass. Preparation of cut flowers for market. 3 lectures, 1 laboratory. Prerequisite: OH 123, SS 221

Ornamental Horticulture

OH 337 Park Planning and Management (4)

Design, management and maintenance of private and public parks and recreational areas. 3 lectures, 1 laboratory. Prerequisite: AE 122, OH 122, 221, 333

OH 338 Advanced Plant Propagation (4)

Advanced nursery and plant propagation practices. Grafting, dormant budding, lining out, balling out, bare rooting, and making hardwood cuttings. Construction and operation of forcing structures. 3 lectures, 1 laboratory. Prerequisite: OH 233



OH 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

OH 402 Garden Center Management (4)

Legal aspects and economics of operating a commercial nursery and garden center. State and county regulations, quarantines, grades and standards of nursery stock. Purchasing, merchandising and record keeping. Trade associations and co-operative buying. 3 lectures, 1 laboratory. Prerequisite: Ec 201 or 211, Actg 131, junior or senior standing.

OH 421 Arboriculture (4)

The care and management of large ornamental trees. The use of ropes and other safety equipment in tree climbing. Cavity work, bracing, cabling, and pruning. 3 lectures, 1 laboratory. Prerequisite: OH 221, 327

OH 431, 432, 433 Landscape Plants I, II, III (3) (3) (3)

Woody and herbaceous plants used in California landscaping. Identification, landscape uses, cultural requirements and growth habits of those plants best shown during the fall, winter, and spring. For non-horticulture majors. 2 lectures, 1 laboratory.

OH 451, 452, 453 Implementation of Landscape Design (2) (2) (2)

Use of plant materials in design; understanding of the ecological, environmental, biological, and esthetics of plant grouping. Planting design related to soils and fertilizers, disease and pest prevention, maintenance and growth factors. 2 laboratories. Prerequisite: Junior standing in Landscape Architecture or Ornamental Horticulture.

OH 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

OH 463 Undergraduate Seminar (2)

An open forum of senior students in which the latest developments, practices, and procedures are discussed. Each student is responsible for the development and presentation of a topic in his chosen field. 2 lectures.

OH 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

OH 581 Graduate Seminar in Ornamental Horticulture (3)

Group study of current problems of the ornamental horticulture industry; current experimental and research findings as applied to production and to the teaching of horticulture.

PHILOSOPHY

Phil 101 Introduction to Philosophy (3)

The relationships among the sciences and between science and philosophy. The principal types of philosophy in their relation to science. How philosophy has influenced the growth of ideas in the sciences and how present scientific developments are related to basic philosophical ideas. 3 lectures.

Phil 221 Traditional Logic (3)

Brief survey of logic, language, and its functions. The nature, recognition, and avoidance of the common informal fallacies. Classical logic including immediate inferences, syllogisms, and sorites. 3 lectures.

Phil 222 Modern Logic (3)

Conditional propositions and reasoning based thereon, including the use of truth tables. Theory of probability, and the use of propositional functions. Theory and use of inductive logic. 3 lectures.

Phil 302 World Religions (4)

Survey of the major living religions of mankind, their histories, teachings about man, his origin, way of life and destiny. 4 lectures.

Phil 311 History of Greek Philosophy (4)

Beginnings of Western Science and philosophy. Pre-Socrates, Socrates, Plato, and Aristotle. Greek philosophies in the Roman world. 4 lectures. Prerequisite: Phil 101

Phil 312 History of Medieval Philosophy (4)

Main developments of Western philosophy from Augustine to Occam, especially the philosophies of Anselm, Abelard, Roger Bacon, Bonaventure, and Aquinas. 4 lectures. Prerequisite: Phil 101

Phil 313 History of Modern Philosophy (4)

Development of Western philosophy from the Renaissance period through Hume with emphasis upon the philosophies of the Continental Rationalists and the British Empiricists. 4 lectures. Prerequisite: Phil 101

Physical Education

Phil 315 Contemporary Philosophy (4)

Contemporary answers to perennial philosophical questions regarding man, the universe, and their relationships. Representative examples from the major contributors to the new movements in philosophy: Existentialism, Phenomenology, Logical Positivism, Analytic Philosophy, and Pragmatism. 4 lectures.

Phil 321 Philosophy of Science (4)

The methods of physics, biology, psychology and other selected sciences, with reference to their presuppositions and general findings. Relations between the sciences and implications of scientific methods for other fields of inquiry. 4 lectures. Prerequisite: Junior standing or a course in philosophy.

Phil 331 Ethics (3)

Implications of ethics and ethical systems; scientific inquiry into the principles of the morality of human actions. 3 lectures. Prerequisite: Phil 101 or instructor's permission.

PHYSICAL EDUCATION

Number Fields for Physical Education Courses

	<i>Co-ed</i>	<i>Men</i>	<i>Women</i>
General Activities	102-124	125-159	160-194
Competitive Athletics		195-216	217-224
Professional Activities		230-239	240-249
(Majors & minors only)			
Academic Courses	250 up		

General Activities

Enrollment is open to all students. Courses satisfy the general education breadth requirement, carry ½ unit of credit, meet 2 hours per week, and are designed to develop skill, knowledge of rules, background and analysis of techniques, and desirable attitudes toward physical fitness and participation in sports.

The beginning course in an activity or its equivalent is prerequisite to the intermediate, and the intermediate to the advanced. Prerequisite may be waived by consent of the instructor.

Students majoring or minoring in physical education may apply a maximum of 12 units of credit earned in activity courses (numbered 102-249) toward the bachelor's degree. Other students may apply a maximum of 6 units (12 courses) toward the degree.

<i>Co-ed</i>	<i>Men</i>	<i>Women</i>
100 Adaptive Activity	125 Apparatus & Gym. Beg. 126 Apparatus & Gym. Adv.	160 Apparatus, Beg. 161 Apparatus, Adv.
102 Badminton	127 Badminton, Beg. 128 Badminton, Adv. 129 Basketball	162 Archery 163 Badminton, Beg. 164 Badminton, Adv. 165 Basketball, Beg. 166 Basketball, Adv. 167 Conditioning
103 Ballet		
104 Bowling (requires fee)		
105 Cycling		
106 Fencing, Int.	130 Fencing, Beg. (with 168)	168 Fencing, Beg. (with 130)
107 Fencing, Adv.		
108 Golf, Beg.		169 Field Hockey, Beg.
109 Golf, Adv.		170 Field Hockey, Adv. 171 Field Sports 172 Figure Control 173 Flag Football 174 Folk Dance (with 131)
	131 Folk Dance (with 174) 132 Handball, Beg. 133 Handball, Adv.	
110 Jogging		
111 Judo	134 Judo	

112 Modern Dance, Beg.	135 Physical Conditioning	175 Jogging
113 Modern Dance, Int.	136 Rugby	176 Rhythmic Gymnastics
	137 Soccer	177 Self Defense
	138 Social Dance (with 178)	178 Social Dance (with 138)
	139 Speedball	179 Softball, Beg.
		180 Softball, Adv.
117 Swimming, Beg.		
118 Swimming, Int.	141 Swimming, Int.	182 Swimming, Int.
119 Swimming, Adv.	142 Swimming, Adv.	183 Swimming, Adv.
120 Senior Lifesaving		
121 Synchronized Swimming		
	143 Tennis, Beg.	184 Tennis, Beg.
122 Tennis, Int.	144 Tennis, Int.	
	145 Tennis, Adv.	185 Tennis, Adv.
		186 Track and Field
	146 Tumbling/Trampoline, Beg.	
	147 Tumbling/Trampoline, Adv.	
	148 Volleyball, Beg.	187 Volleyball, Beg.
123 Volleyball, Int.		
	149 Volleyball, Adv.	188 Volleyball, Adv.
	150 Water Polo	
	151 Weight Training	
	152 Wrestling	

Competitive Athletics

Enrollment limited to those qualified to compete in intercollegiate athletic programs. Consent of coach required. Total credit limited to 6 units. Courses are each 1 unit and meet for a minimum of 10 hours per week.

<i>Co-ed</i>	<i>Men</i>	<i>Women</i>
226 Fencing	195 Baseball	
	196 Basketball	217 Basketball
	198 Cross Country	
	199 Football	
	200 Golf	
	204 Rugby	
	205 Soccer	
	206 Swimming	
	207 Tennis	219 Tennis
	208 Track and Field	220 Track and Field
	209 Volleyball	221 Volleyball
	210 Water Polo	
	211 Wrestling	

Professional Activities

Enrollment limited to those students pursuing a major or minor in physical education. A minimum of six courses must be completed (Men: 230-237; Women: 240-246). Course selection is determined by the student's adviser. All courses are 1 unit and meet for four hours per week.

<i>Men</i>	<i>Women</i>
230 Apparatus/Tumbling	240 Archery/Golf
231 Aquatics/Golf	241 Badminton/Tennis
232 Badminton/Tennis	242 Basketball/Volleyball
233 Baseball/Handball	243 Field Sports
234 Basketball/Volleyball	244 Gymnastics
235 Field Sports/Wrestling	245 Swimming
236 Football/Track and Field	246 Track and Field
237 Physical Cond./Weight Train.	

Academic Courses

Professional courses designed primarily for the student majoring or minoring in physical education. Course 250 may be used in partial satisfaction of the General Education Breadth requirement in physical education.

PE 250 Health Education (2)

An introductory health course geared to bridge the gap between scientific health discoveries and one's application of these discoveries in the daily living pattern. 1 lecture, 1 recitation.

Physical Education

PE 254 School Health Program (2)

Introduction to school health services, instruction, and environment within the public and private school system. 2 lectures.

PE 260 Community Recreation (3)

The community recreation program. Activities and responsibilities of playground leaders and their supervisors. 1 lecture, 2 two-hour laboratories.

PE 264 Administration of Recreation (3)

Supervision and administration of recreation. Facilities, budget, equipment maintenance, public relations, and special activities. 2 lectures, 1 two-hour laboratory.

PE 270 Introduction to Physical Education (2)

Designed to acquaint the student with concept of Physical Education as a profession and to orient the student to the Cal Poly program. 2 lectures.

PE 274 History and Philosophy of Physical Education (3)

History of physical education including philosophical, institutional, and personal influences. Application of education principles to physical education. 3 lectures.

PE 278 Techniques of Officiating (3)

Techniques of officiating men's sports. 2 lectures, 1 two-hour laboratory.

PE 280 Safety and First Aid (2)

A standard American Red Cross first aid course. Instruction and practice in the immediate and temporary care of injuries and sudden illness. 1 lecture, 1 two-hour laboratory.

PE 284 Water Safety (1)

Review of life saving skills, swim strokes, and teaching methods.

Upon successful completion of this class the student receives the water safety instructor's card from the American Red Cross. 2 one and one-half hour laboratories. Prerequisite: Current life saving card.

PE 296 Organization and Planning Technique (3)

Practical skills and techniques of teaching physical education in junior and senior high schools. Unit and lesson planning and organizing, class management and procedure, teaching aids, evaluation skills. 2 lectures, 1 two-hour laboratory.

PE 300 Safety Education (3)

Principles and practices of safety as applied to home, fire, industrial, school, community, and traffic situations. Accident prevention. 3 lectures.

PE 302 Kinesiology (3)

Science of human movement integrating both structural and functional aspects. Anatomy, physiology, and elementary mechanics in relation to movement in sports, work, and the activities of daily living. 2 lectures, 1 two-hour laboratory. Prerequisite: Zoo 337

PE 303 Physiology of Exercise (3)

Application of the knowledge of human physiology to exercise situations. 2 lectures, 1 two-hour laboratory. Prerequisite: Zoo 338, 339

PE 311 Swimming and Water Sports—Theory and Practice (2)

Supervision of pool activities. Swimming instruction and safety. Teaching and coaching swimming and water polo. 1 lecture, 1 two-hour laboratory. Prerequisite: Demonstrated swimming ability.

PE 319 Tests and Measurements in Physical Education (3)

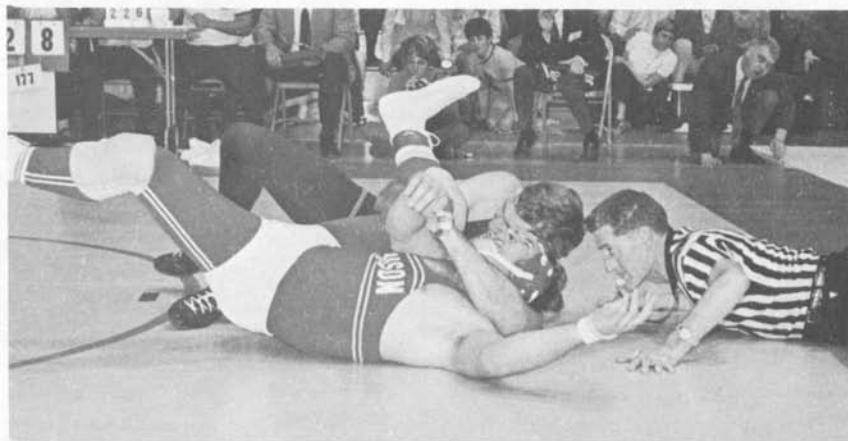
Physical tests and measurements of skill, strength, speed, and endurance as a basis for grading and as a measure of progress in activities. 2 lectures, 1 two-hour laboratory. Prerequisite: Stat 211

PE 321 Football Coaching Theory and Practice (2)

Fundamentals and systems of offensive and defensive football. Care and purchase of equipment, supplies and facilities. Rules of the game. 1 lecture, 1 two-hour laboratory.

PE 323 Baseball Coaching Theory and Practice (2)

Fundamentals of baseball with emphasis on strategy, selection of players, officiating, interpretation of rules, scoring, and administration of interschool games. 1 lecture, 1 two-hour laboratory.

**PE 327 Wrestling Coaching Theory and Practice (2)**

Coaching techniques of wrestling. Emphasis on skill instruction, dual meet and tournament organization, officiating, interpretation of rules. 1 lecture, 1 two-hour laboratory.

PE 331 Intramural Sports (3)

Principles and policies underlying programs of intramural sports in secondary schools and community centers. 2 lectures, 1 two-hour laboratory.

PE 332 Elementary School Physical Education (3)

Prepares the student to guide elementary school age children through a well-balanced program in physical education. Aims, objectives, procedures, methods, evaluation and program planning. 1 lecture, 2 two-hour laboratories.

PE 333 Track and Field Coaching Theory and Practice (2)

Coaching techniques for various track and field events. Problems of team balance; study of rules. 1 lecture, 1 two-hour laboratory.

PE 334 Introduction to Dance (3)

History, rhythmic analysis, accompaniment for creative dance. Limited to men and women P.E. majors and minors. 1 lecture, 2 two-hour laboratories.

PE 337 Camping and Outdoor Education (3)

Introduction to current status, principles, organization and administration of outdoor education and camping. 2 lectures, 1 two-hour laboratory.

PE 355 Apparatus and Gymnastics (2)

A critical analysis of the methods and problems in teaching and coaching apparatus and gymnastics. Application is made to the secondary teaching situation with emphasis on lesson planning, development of teaching units, organization for class activity and administration of the program. 1 lecture, 1 two-hour laboratory.

Physical Education

PE 371 Aquatics (3)

Problems and techniques in teaching swimming, water sports, and synchronized swimming for girls in secondary schools. 1 lecture, 2 two-hour laboratories. Prerequisite: PE 245, 296

PE 373 Gymnastics (2)

Techniques and problems in teaching gymnastics. Women PE majors and minors. 2 two-hour laboratories. Prerequisite: PE 244, 296

PE 375 Sports for Women (3)

Technique and problems in teaching archery, tennis, volleyball, and field hockey for junior and senior high school girls. 1 lecture, 2 two-hour laboratories. Prerequisite: PE 240, 241, 242, 243, 296

PE 377 Sports for Women (3)

Technique and problems in teaching golf, badminton, basketball, flag football for junior and senior high school girls. 1 lecture, 2 two-hour laboratories. Prerequisite: PE 240, 241, 242, 243, 296

PE 379 Track and Field for Women (2)

Techniques and problems in teaching track and field activities for secondary girls. 2 two-hour laboratories. Prerequisite: PE 246, 296

PE 381 Recreational Dance Theory (3)

Selection of music; theory, methods and problems in teaching social, folk, and square dance in secondary schools. 1 lecture, 2 two-hour laboratories. Prerequisite: PE 296, 334

PE 383 Modern Dance Theory (3)

Development of teaching skills for dance instruction and production in junior and senior high schools. 1 lecture, 2 two-hour laboratories. Prerequisite: PE 296, 334

PE 390 Basketball Officiating (1)

Rules interpretation and officiating of women's basketball. 1 three-hour laboratory. Prerequisite: PE 242

PE 392 Officiating Gymnastics (1)

Development of judging technique in women's gymnastics. 1 two-hour laboratory. Prerequisite: PE 244

PE 394 Officiating Track & Field (1)

Rules interpretation and officiating track and field events. 1 two-hour laboratory. Prerequisite: PE 246

PE 396 Volleyball Officiating (1)

Rules interpretation and officiating of women's volleyball. 1 three-hour laboratory. Prerequisite: PE 242

PE 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Senior standing or permission of the instructor.

PE 401 Organization and Administration of Health and Physical Education (3)

Underlying philosophy, principles, policies, and procedures of administration as applied to health and physical education. Legal aspects and the interrelationships with the general school curriculum at the local, state, and national levels. 3 lectures.

PE 405 Administration of School Health Education (2)

Current procedures and policies in curriculum development and basic administration of health education programs. 2 lectures.

PE 406 Adaptive Physical Education (3)

Growth and development patterns; their relation to special and regular physical education programs. Analysis of postural divergence and procedures for prevention and correction. 2 lectures, 1 two-hour laboratory. Prerequisite: PE 302, 303

PE 422 Basketball Coaching Theory and Practice (2)

Fundamental individual basketball skills. Theories of offensive and defensive team play. 1 lecture, 1 two-hour laboratory.

PE 432 Athletic Training and Massage (2)

Modern principles and practices in conditioning and care of athletes. Theory and practice in the scientific manipulation of the muscles as related to therapeutic exercise. 2 two-hour laboratories.

PE 436 Coaching Women's Sports (3)

Effect of success and failure in competitive situations. Understanding the role of competition in our society as viewed from psychological, sociological and physiological perspectives. 3 lectures. Prerequisite: PE 296 and senior standing.

PE 440 Physical Education Activity (1)

Required of all physical education majors. Emphasis will be given to class organization of required physical education classes. Total credit limited to 3 units. 2 one-hour periods. Prerequisite: PE 319 and completion of required activity classes.

PE 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time. Prerequisite: PE 319

PE 500 Individual Study (1-3)

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Prerequisite: PE 517 and consent of department head, graduate adviser, and supervising faculty member.

PE 501 Adaptive Physical Education Seminar (3)

Advanced techniques in the detection of defective body mechanics and establishment of class procedures for prevention and elimination of these defects. Individual case studies. 3 meetings.

PE 502 Advanced Seminar in Problems of Physical Education (3)

Practical problems in physical education and their solution in terms of desired objectives in this field. 3 lectures.

PE 506 Physical Education for the Mentally Retarded (2)

Development of concepts and activities for trainable and educable mentally retarded. Contributions of physical education to the growth and development of the mentally retarded as an integral tool in their education and training. 2 lectures. Prerequisite: Graduate standing.

PE 511 Administration of Physical Education (3)

Principles and techniques of administration of physical education on the elementary and secondary school levels. 3 lectures.

PE 512 Critical Health Issues (3)

Contemporary health issues and related information. Adaptability of scientific health discoveries to current patterns of living. 3 lectures.

PE 513 Evaluation of Current Studies (3)

Analysis and evaluation of published studies in physical education, health education and recreation. 3 lectures. Prerequisite: PE 517

Physical Science

PE 516 Physical Education Facilities, Equipment and Finance (3)

Design and construction of physical education facilities. Budgeting and financing physical education, intramural, and athletic facilities and programs. 3 lectures. Prerequisite: Graduate standing.

PE 517 Research Methods in Physical Education (3)

Experimental, descriptive, historical, philosophical, and action research in physical education. Selection of adequate problems for investigation; various sampling techniques and analyses; use of library facilities; manuscript requirements for the thesis. 3 lectures. Prerequisite: PE 319 or consent of the instructor.

PE 521 Curriculum and Methods in Health and Physical Education (3)

Methods, curricular materials, and evaluation procedures in elementary and secondary schools health and physical education. 3 lectures.

PE 522 Mechanical Analysis of Sports (3)

Application of principles of body mechanics to physical education and sports activities as a basis for analyzing and improving motor performance. 3 lectures. Prerequisite: PE 302, 303, consent of instructor

PE 523 Administration of Co-Curricular Activities (3)

The place of co-curricular activities in education. Particular emphasis on purposes, administrative control, management and operational policies of men's and women's programs. 3 lectures.

PE 525 Motor Learning (3)

Analysis of research principles and concepts of motor performance and learning directed toward psychology of teaching and coaching. 3 lectures.

PE 526 Sports in American Life (3)

Analysis of physical education in U.S. culture, socio-cultural variables, changing patterns, current trends, problems and issues. 3 lectures.

PE 530 Advanced Physiology of Exercise (3)

Effects of exercise on human beings in relation to performance and physiological adjustment to activity. 2 lectures, 1 two-hour laboratory. Prerequisite: PE 303

PE 599 Thesis (2) (2) (2)

Independent research under the guidance and supervision of the staff. Prerequisite: PE 517, consent of graduate adviser and supervising faculty member.

PHYSICAL SCIENCE

PSc 101 The Physical Environment: Matter and Energy (4)

Nonmathematical introduction to the basic principles of physical science and application of these principles in modern society. Objects at rest and in motion, energy and power, fluids, heat, light, and sound. 3 lectures, 1 recitation.

PSc 102 The Physical Environment: Atoms and Molecules (4)

Nonmathematical introduction to the basic principles of the atomic, molecular, and sub-atomic behavior of matter, and applications of these principles in modern society. Electricity and magnetism, electrical nature of matter, organic and inorganic chemistry, modern physics, the nucleus. 3 lectures, 1 recitation. Prerequisite: PSc 101

PSc 103 The Physical Environment: Earth and the Universe (4)

Nonmathematical introduction to the basic principles of the earth sciences and astronomy, and applications of these principles in modern society. Structure and formation of the earth, earthquakes, weather, oceanography, solar system, stars, and cosmology. 3 lectures, 1 recitation. Prerequisite: PSc 101

PSc 171 Science and Society for Non Scientists (3)

Interdisciplinary approach to contemporary science-society issues. Three 3-week periods, each conducted by a professor from a different scientific discipline. 3 lectures. Prerequisite: 8 units of science; not open to science, engineering and mathematics majors.

PSc 471 Science and Society (3)

Interdisciplinary approach to contemporary science-society issues. Five two-week periods, each conducted by a professor from a particular discipline. 3 lectures. Prerequisite: Senior standing in a science, mathematics or engineering major.

PSc 521 Curriculum and Methods in the Physical Sciences (3)

Techniques, aims and objectives in the teaching of physics, chemistry, physical science, and general science at the secondary school level. Selection and organization of teaching material. Evaluation of results. 3 lectures. Prerequisite: Graduate standing.

PHYSICS

Phys 100 Introduction to Physics (1)

Introduction to the professional work of the physicist. Content and methods of physics. Orientation to the resources and objectives of the Physics Department. 1 lecture.

Phys 101 Concepts of Physics (3)

Non-mathematical descriptive presentation of Einstein's special and general relativity, quantum mechanics, basic symmetries and conservation laws, elementary particles of nature, nuclear models and reactions, other topics of current interest. Discussion of basic concepts at an elementary level. 3 lectures.

Phys 104 Introductory Physics (4)

Fundamental principles of mechanics, heat, light and electricity. Not to be taken by students who have taken a college course in Physics. 4 lectures. Prerequisite: Math 103 or 114 or 117

Phys 113 Physics of Sound Reproduction (1)

Nonmathematical introduction to the physical principles of sound reproduction. Qualitative study of sound, hearing and psychoacoustics, room acoustics, signals and noise, power, audio systems, transducers. 1 two-hour activity.

Phys 121, 122, 123 College Physics (4) (4) (4)

Fundamental principles of mechanics; hydraulics, heat, light and sound; magnetism, electrostatics, current electricity, atomic and nuclear physics. Not open to students who have previously taken corresponding college courses in physics. 3 lectures, 1 laboratory. Prerequisite: Math 103 or 115 or 117

Phys 124 Introduction to Modern Physics (3)

Elementary treatment of relativity, atomic structure, atomic spectra; nuclear radiation and detection; nuclear reactions, radioactivity and nuclear energy. Not open to students with credit in Phys 211. Will not satisfy the Phys 211 requirement. 3 lectures. Prerequisite: Phys 121

Phys 131 General Physics (4)

Fundamental principles of mechanics: vectors, particle kinematics, statics and dynamics, equilibrium of a rigid body, work and energy, linear momentum. For scientists and engineers. 3 lectures, 1 laboratory. Prerequisite: Math 141.

Phys 132 General Physics (4)

Rotational kinematics and dynamics, oscillations, waves in elastic media, sound waves, temperature, heat and the first law of thermodynamics, kinetic theory of matter, second law of thermodynamics. 3 lectures, 1 laboratory. Prerequisite: Phys 131

Physics

Phys 133 General Physics (4)

Charge and matter, electric field, electric potential, dielectrics, capacitance, current and resistance, electromotive force and circuits, magnetic fields, magnetic field of a moving charge, induced emf, geometric and wave properties of light. 3 lectures, 1 laboratory. Prerequisite: Phys 131, Math 142

Phys 134 General Physics (3)

Magnetic properties of matter, Maxwell's equations, electromagnetic waves, radiation, physical optics. 3 lectures. Prerequisite: Phys 133 or EL 207

Phys 137 General Physics: Mechanical Vibrations and Electric Circuits (4)

Damped, forced, and coupled oscillations in mechanical structures and electric circuits. Applications to earthquake movements, alternating current circuits, and electronic instrumentation. For School of Architecture and Environmental Design majors. 3 lectures, 1 laboratory. Prerequisite: Phys 132, Math 142

Phys 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

Phys 206 Electrical Circuits (3)

Direct current, alternating current, and electronic circuits. 3 lectures. Prerequisite: Phys 133, Math 143

Phys 211 Modern Physics (4)

Fundamental principles of modern physics, emphasizing atomic and quantum phenomena. Introduction to special relativity; wave-particle duality; atomic structure; elementary statistical mechanics. 4 lectures. Prerequisite: Phys 133 or EL 207 or equivalent.

Phys 213 Introduction to Nuclear Physics (3)

Nuclear radiations and interactions. Detection methods, instruments and radioactive hazards. Nuclear reactions and induced radioactivity. Nuclear energy. 3 lectures. Prerequisite: Phys 211

Phys 243 Introductory Nuclear Physics Laboratory (1)

Techniques of nuclear radiation detection and measurement including Geiger, proportional and scintillation counting. Properties of alpha, beta and gamma radiation. 1 laboratory. Prerequisite or concurrent: Phys 213, Phys 256 or equivalent.

Phys 256, 257 Electrical Measurements Laboratory (1) (1)

Experimental studies of circuit analysis and electronics; introduction to digital techniques; instrumentation. 1 laboratory. Prerequisite: Phys 133, Math 143

Phys 301 Heat (3)

Thermodynamics and statistical mechanics. Entropy, temperature, chemical potential, free energy. Selected applications including paramagnetism, ideal gas, Fermi-Dirac distribution. 3 lectures. Prerequisite: Phys 211, Math 241

Phys 302 Analytic Mechanics (3)

Vector analysis, statics of particles and rigid bodies, uniform and parabolic catenary, laws of motion, kinematics and dynamics of a particle. Work and energy. Particle in uniform field. Oscillatory motion (damped and forced oscillation). Center of mass. Linear and angular momentum. 3 lectures. Prerequisite: Phys 131, Math 318 or 305, 404

Phys 303 Analytic Mechanics (3)

Dynamics of a rigid body, central force motion, accelerated reference frames. Three-dimensional motion of a rigid body, introduction to Lagrange's and Hamilton's equations. 3 lectures. Prerequisite: Phys 302

Phys 312 Waves and Vibrations (3)

Introductory treatment of mechanical and electromagnetic waves. Fourier series. Damped oscillations. Coupled oscillations and normal modes, the wave equation and solutions. 3 lectures. Prerequisite: Phys 303 or ME 212, Math 242. Recommended: Math 319

Phys 317 The Special Theory of Relativity (3)

Fundamental experiments and basic postulates of special relativity. Simultaneity, length and time measurements. Lorentz transformations. Four-Vectors. Space-time diagrams. Relativistic mechanics and electromagnetism. 3 lectures. Prerequisite: Phys 211

Phys 323 Physical Optics (4)

The physical nature of light. Reflection, refraction, diffraction, interference, polarization and absorption. Coherent and noncoherent wave phenomena. Introduction to Fourier optics and holography. 3 lectures, 1 laboratory. Prerequisite: Phys 211, Math 241

Phys 341, 342 Quantum Physics Laboratory (1) (1)

Experimental studies of particles and radiation, their quantum properties and interactions with atoms and nuclei. 1 laboratory. Prerequisite: Phys 256, 243

Phys 363 Undergraduate Seminar (2)

Study of current developments in physics and discussion of periodicals of an appropriate level. 2 meetings.

Phys 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigations, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of the department head.

Phys 403 Nuclear Physics (3)

Nuclear reactions. Structure of the nucleus. Nuclear energy levels. Radioactive decay processes. Nuclear fission. Nuclear spin and magnetic moment. Elementary particles. 3 lectures. Prerequisite: Phys 213, 405

Phys 408, 409 Electromagnetic Fields and Waves (4) (3)

Electric and magnetic field theory using vector analysis. Electric fields, dielectric materials, magnetic fields, induced emf's, magnetic materials, Maxwell's equations, wave equations, plane electromagnetic waves. Dipole radiation, radiation from an accelerated charge. 4 lectures, 3 lectures. Prerequisite: Phys 133, Math 318 or 305, Math 404

Phys 405 Quantum Mechanics (3)

The wave nature of matter. The wave function and its interpretation. The Schrodinger equation. Solutions for one dimensional problems and the one electron atom. 3 lectures. Prerequisite: Phys 211; Math 242. Recommended: Math 318 or 305, 404

Phys 406 Solid State Physics (3)

Crystalline structure of solids. Vibrational and electronic energies in the crystal lattice. Electrical, thermal, and magnetic properties of metals, insulators, and semiconductors. 3 lectures. Prerequisite: Phys 405

Phys 407 Quantum Mechanics (3)

Interaction of an atom with an external magnetic field. Total angular momentum. Perturbation theory. Multi-electron atoms. Radiative transitions. Electron spin and Pauli spin matrices. 3 lectures. Prerequisite: Phys 405

Phys 412 Solid State Physics for Engineers (3)

Basic quantum mechanics. Application to atomic structure and bonding. Crystal structures and their determination. Elementary treatments of Fermi statistics, free electron theory and band theory of solids, bulk properties of metals and semiconductors. Application to optical properties of solids and to selected current topics of interest (lasers, superconductivity, etc.). 3 lectures. Prerequisite: Phys 211, Met 306

Political Science

Phys 413 Advanced Topics in Solid State Physics (3)

Lattice dynamics, exchange charge model of ionic crystals, band theory, transport phenomena. Properties of superfluids and conductors, current experimental techniques. Review of the present state of the art from journal articles. 3 lectures. Prerequisite: Phys 406, 412, or consent of instructor.

Phys 421 Nuclear Reactor Physics (4)

Nuclear fission. Nuclear chain reaction. Neutron diffusion. Thermal reactor critical equation. Time varying system. Reactor control and factors affecting multiplication. 3 lectures, 1 laboratory. Prerequisite: Phys 243, Math 242

Phys 452 Solid State Physics Laboratory for Engineers (1)

Selected experiments on the solid state of matter using electrical, optical, and x-ray methods. 1 laboratory. Prerequisite or concurrent: Phys 412

Phys 456 Solid State Physics Laboratory (1)

Experimental study of the solid state of matter using X-ray, electrical and optical methods. 1 laboratory. Prerequisite or concurrent: Phys 406. Prerequisite: Phys 441 or consent of instructor.

Phys 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

Phys 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

Phys 501 Selected Topics in Advanced Physics (3)

Topics in mathematical physics or advanced experimental work. 3 lectures. Prerequisite: Graduate standing.

Phys 502 Nuclear Physics (3)

Instrumentation, methods, and results of experiments. Systematics and theory of nuclear structure. 3 lectures. Prerequisite: Graduate standing.

POLITICAL SCIENCE

Pol Sc 100 U. S. History and Government (3)

Basic structure and operation of the federal government. The constitution as a modern regulatory instrument; bases of American ideals. Function of state and local government. This course may not be substituted for Hist 204, 205, Pol Sc 201 or 401. 3 lectures. Not open to degree students for degree credit.

Pol Sc 101, 102 National and California Government (3) (3)

Concepts and techniques of political science; Governmental institutions of the United States. California state and local political institutions and problems. Completion of PolSc 101 and 102 will satisfy the California state requirements in the United States Constitution, state and local government. 3 lectures.

Pol Sc 105 Introduction to International Relations (3)

Introduction to dynamics, character and substance of power relations among nations; conflict and accommodation, including the nature of the state and the international community. 3 lectures.

Pol Sc 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

Pol Sc 201 American Government (3)

The origin, nature, and distribution of political power. Declaration of Independence. The Constitution of the United States. Function and current problems of national, state and local government. Finding and evaluating authoritative source materials on political affairs. Not open to students with credit in or enrolled in Pol Sc 101. 3 lectures.

Pol Sc 202 Comparative Government (3)

Comparative study of the government of the United Kingdom and other selected Western European countries. 3 lectures. Prerequisite: Pol Sc 101 or 201

Pol Sc 203 Basic Political Analysis (3)

The discipline of political science; its subject matter and fields; introduction to the science of political analysis. 3 lectures. Prerequisite: 9 units of political science.

Pol Sc 204 Basic Concepts of Political Thought (3)

Introduction to major concepts (such as authority, equality, force, individual, justice, law, political obligation, power, rights, state) which affect our thinking about social relations. The social and political theories of thinkers from Socrates to Machiavelli. 3 lectures.

Pol Sc 206 Law Enforcement Processes (3)

Social and political influences affecting the law and its enforcement. Examination of selected steps in the law enforcement process. The roles of police, courts, judges, prison officials, and parole officers. 3 lectures.

Pol Sc 302 American Political Process (3)

Political parties, pressure groups, public opinion and the role of each in contributing to the dynamics of the American political process. 3 lectures. Prerequisite: Pol Sc 101 or 201

Pol Sc 303 Minority Group Politics (3)

Analysis of political factors affecting minority groups in America. Involvement, organization and role of minority groups in the political process. Emphasis on the political behavior of black and chicano minorities. 3 lectures. Prerequisite: Soc 214 Eth S 114 or Pol Sc 302

Pol Sc 306 Modern Political Thought (3)

Theories of political control and the relationship between man and the state. 3 lectures. Prerequisite: Pol Sc 204 or junior standing.

Pol Sc 311 Inter-American Relations (3)

Inter-American affairs. Political, economic, and social problems; forces motivating cultural behavior, industrial development, trade techniques, agriculture methods. Opportunities for employment in agriculture, engineering, and business. Finding and evaluating authoritative source materials on Latin American affairs. 3 lectures. Prerequisite: Pol Sc 201, Hist 204

Pol Sc 312 International Politics (3)

International political processes and problems; foreign policies and politics in relations between states; conflicts and adjustments. Analyses of selected problems. 3 lectures. Prerequisite: Pol Sc 105

Pol Sc 314, 315, 316 Public Administration (3) (3) (3)

Administration of public services; organization and procedures in theory and practice; dynamics of public policy management, politics and administration, responsible bureaucracy. Areas and problems of administrative research; methods of analyzing organizational structures and functions; planning and administration of programs. The ecology of public administration. 3 lectures. Prerequisite: Pol Sc 201 or Pol Sc 101, 102

Pol Sc 321 American Constitutional Law (3)

Basic principles of American constitutional law developed by the case method. Judicial review, separation of powers, federalism, individual rights and duties. 3 lectures. Prerequisite: Pol Sc 101 and 102, or 201

Political Science

Pol Sc 335 Legislative Process (3)

Organization and procedures of Congress, state and local legislative bodies, theory and practices of representative government. Problems of representation in selected political systems. 3 lectures. Prerequisite: Pol Sc 101 or 201

Pol Sc 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

Pol Sc 401 State and Local Government (3)

Structure, function and problems of state, county, and local governments. 3 lectures. Prerequisite: Pol Sc 102 or 201

Pol Sc 402 Politics and Governments of Developing Areas (3)

Institutions and processes of governments in a selected world area experiencing economic and political development. Each time the course is offered it will bear a subtitle descriptive of the particular area studied. 3 lectures. May be repeated to a total of 9 units. Prerequisite: Pol Sc 201 and Hist 205 or equivalent.

Pol Sc 403 Municipal Government (3)

Organization, politics, and problems of contemporary American municipalities. Trends in city life and government. 3 lectures. Prerequisite: Pol Sc 102 or 201

Pol Sc 405 Politics of Municipal Finance and Planning (3)

Political and economic considerations affecting the decision-making process of planning departments, commissions, and other local government decision-making boards. The budgetary process, interest groups, urban renewal, economic development at the subnational level. 3 lectures. Prerequisite: Pol Sc 401 or 403 or equivalent.

Pol Sc 411 Contemporary U.S. Foreign Policy (3)

The formulation and conduct of U.S. foreign policy. Analysis of the theory and elements of U.S. strategy; diplomacy, propaganda, economic operations, psychological warfare, and military strategies. 3 lectures. Prerequisite: Pol Sc 105

Pol Sc 412 International Organization (3)

Structure, functions, powers of the United Nations, selected regional organizations, and specialized agencies. Current problems facing international organizations. 3 lectures. Prerequisite: Pol Sc 105

Pol Sc 418 Contemporary Problems and Institutions of the U.S.S.R. (3)

Study and analysis of political, economic, and social institutions and conditions of the U.S.S.R. 3 lectures. Prerequisite: Junior standing or consent of instructor.

Pol Sc 440 Supervised Field Work (3)

Supervised observation, research and work in community organizations or public agencies. Prerequisite: Senior standing and permission of instructor.

Pol Sc 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

Pol Sc 463 Undergraduate Seminar (2)

Preparation and presentation of current developments in the field of political science. 2 meetings. Prerequisite: Pol Sc 461, 462 or consent of instructor.

Pol Sc 465 Contemporary Problems and Institutions of the Middle East and Africa (3)

Study and analysis of political, economic, and social institutions and conditions of the countries of the Middle East and North Africa. 3 lectures. Prerequisite: Junior standing or consent of instructor.

Pol Sc 468 Contemporary Problems and Institutions of Africa South of the Sahara (3)

Study and analysis of indigenous institutions, Western influences, and nationalism in Africa south of the Sahara. Selective area studies illustrative of colonialism and the politics of independence. 3 lectures. Prerequisite: Junior standing or consent of instructor.

Pol Sc 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

Pol Sc 590 Seminar in Political Science (3)

Special problems in selected areas of Political Science. Each seminar will have a subtitle describing its nature and content. 3 lectures. Maximum of 6 units may be earned. Prerequisite: Graduate standing and consent of instructor.

POULTRY INDUSTRY

PI 121 Poultry Industry Development (4)

Scope and importance of the poultry industry as a part of California agriculture. Poultry organizations, publications, employment opportunities. Basic skills in industry organization. 3 lectures, 1 laboratory.

PI 122 Replacement Programs and Broiler Production (4)

Organization and planning of the replacement program on the commercial poultry enterprise. Modern techniques and practices including costs, facilities, and management of the replacement program. 3 lectures, 1 laboratory.

PI 123 Poultry Feeding and Nutrition (4)

Nutritional requirements, feeding principles and modern practices. Formulation of rations for specific purposes and commercial economy practices. Feed industry distributive procedures. 3 lectures, 1 laboratory. Prerequisite: ASci 101

PI 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

PI 221 Poultry Selection and Egg Production (2)

Biological environmental factors that affect quality, size, and number of eggs produced. Techniques and practices of working with the commercial producing flock. 1 lecture, 1 laboratory.

PI 222 Poultry Products, Processing and Marketing (3)

Assembling, processing, distributing and merchandising of poultry meat and eggs. Standardization and regulations applicable to the marketing of poultry products. Development and promotion of consumer products. 2 lectures, 1 laboratory.

PI 223 Poultry Incubation (2)

Embryology fundamentals and metabolism of the developing embryo. Artificial incubation practices as applied in the commercial hatchery. Nutritional, genetic and environmental factors that affect the hatch. 1 lecture, 1 laboratory.

PI 230 General Poultry Production (3)

Survey of the various phases of the modern poultry industry including nutrition, breeding, flock health, production and management. Business aspects of poultry production and marketing of products. Not open to poultry majors. 2 lectures, 1 laboratory.

PI 231 Poultry Anatomy and Physiology (3)

Structural aspects and normal functions of the principal systems of domestic poultry. 2 lectures, 1 laboratory. Prerequisite: Zoo 131 or Bio 100

Poultry

PI 233 Poultry Plant Design and Equipment (2)

Design and planning a modern commercial poultry operation. The engineering of buildings and equipment to specific commercial functions. Coordination of buildings, equipment and operations designed for maximum plant efficiency. 1 lecture, 1 laboratory.

PI 303 Poultry Hygiene and Flock Health (3)

Management, sanitation and vaccinating programs for the maintenance of the flock health. Control and prevention of diseases and parasites. 3 lectures. Prerequisite: Bact 221

PI 305 Game Bird Propagation and Management (4)

Game bird anatomy, physiology and nutrition. Health, natural and artificial reproduction, and rearing techniques as practiced in public resource programs and private enterprises. Participation in an organized two-day field trip is required. 3 lectures, 1 laboratory. Prerequisite: One quarter college mathematics, one quarter animal biology and Chem 121

PI 320 Poultry Consumer Education (2)

Buyer's guide for poultry products. Consumer grade standards of eggs and poultry meat. Surveys of live and market classes of poultry. Testing eggs and egg products. The use of embryos and baby chicks for demonstration and teaching in the classroom. 1 lecture, 1 two-hour activity.

PI 321 Applied Poultry Breeding (3)

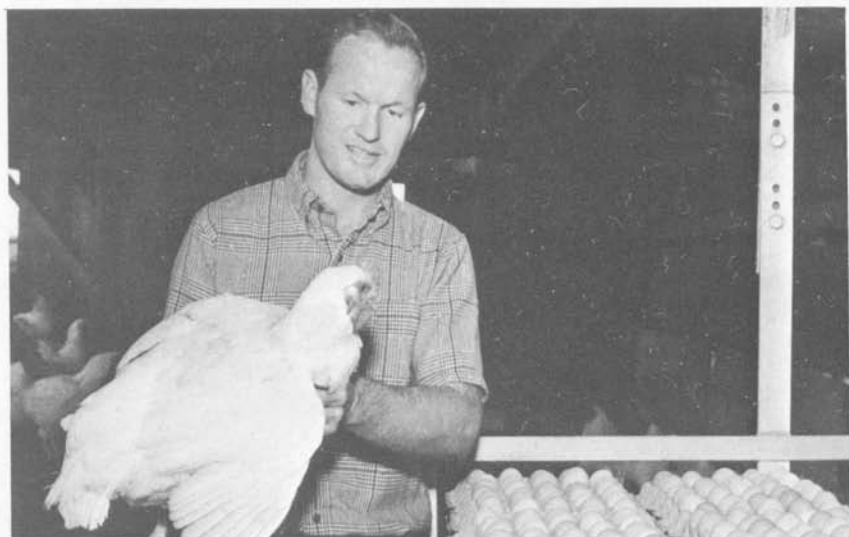
Genetic applications in the development of commercial poultry stocks for specific productive designs. Application of commercial breeding techniques for flock improvement. Analysis of breeding records. 2 lectures, 1 laboratory.

PI 322 Hatchery Business Organization (4)

Organization and management of a commercial hatchery operation. Recruiting and supervising personnel, organizing flow of products and planning the distribution systems. Managing the finance, advertising, public relations, and sales phases of the hatchery organization. 3 lectures, 1 laboratory.

PI 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.



PI 402 Advanced Poultry Enterprise Supervision (3)

Coordination and supervision of the modern commercial poultry enterprise. Analysis of operational procedures, efficiency practices, cost and quality control techniques. Interrelationship of business practices to the enterprise success. 3 lectures. Prerequisite: Consent of instructor.

PI 421 Turkey Industry (3)

Coordination and operation of a commercial turkey enterprise. Application of nutritional, breeding, disease control and marketing practices. Planning and supervising the specialized phases of the turkey enterprise. Development of new products and specialized marketing techniques. 2 lectures, 1 laboratory. Prerequisite: Consent of instructor.

PI 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

PI 463 Undergraduate Seminar (2)

Preparing and presenting in an organized manner reports on new trends, special problems, research developments related to the poultry industry. Group discussion of industry special problems. 2 meetings.

PI 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

PI 530 Poultry Business Dynamics (3)

For graduate students enrolled in PI 230. Additional application of advanced poultry problems in the student's major field. 2 lectures, 1 laboratory.

PI 581 Graduate Seminar in Poultry (3)

Current trends and characteristics of the poultry industry enterprise. Group discussions of skills, techniques and practices to improve teaching of vocational agriculture as it applies to poultry. 3 meetings.

PSYCHOLOGY

Psy 104 Effective Study Techniques (2)

Designed to acquaint students with basic aims and objectives of going to college, and to provide adequate instruction and practice in specific study skills; effective study methods, note-taking, time-planning, memory, concentration. 1 lecture, 1 quiz section.

Psy 202 General Psychology (3)

Biological individuality; heredity and environment; motives; emotions; sensory activity and its use by the individual; learning and remembering; thinking and creating; intelligence; abilities; personality; culture and the individual; oneself and others. 2 lectures, 1 recitation.

Psy 251 Laboratory in Group Activities (1)

Skills and techniques of solving problems in large and small groups; conducting and reporting meetings; analyses of leadership dynamics in campus organizations. 1 two-hour laboratory. Total credit limited to 6 units.

Psy 301 Personality and Mental Health (3)

Factors of mental health; achieving efficiency; personality development; emotional control; social adaptation; improvement of thinking; religion; program for mental health. 3 lectures. Prerequisite: Psy 202

Psychology

Psy 302 Psychology of Business and Industry (3)

Psychological factors involved in employer-employee relationships, an analysis of the current practices of business and industry relative to personnel procurement, placement, training, conditions of work and productivity, human relations, wages, and job evaluation. 3 lectures. Prerequisite: Psy 202

Psy 304 Comparative and Physiological Psychology (3)

Variables relevant to the interaction of physiological and behavioral processes. Learning, motivation, emotion, perception, individual differences, social and abnormal behaviors as a function of the nervous and endocrine systems, sensory structures, genetic factors, effects of drugs. 3 lectures. Prerequisite: 6 units of psychology or 6 units of natural science.

Psy 307 Abnormal Psychology (3)

Abnormal behavior of individuals. Dynamics, etiology, symptoms, treatment and prevention of the more severe personality and behavior disorders. Includes the psychoneuroses, psychoses, alcohol and drug addiction, psychosomatic illnesses, and character disorders. 3 lectures. Prerequisite: Psy 202

Psy 311 Human Factors (3)

Human decision-making and problem-solving capabilities and limitations. The visual field and other characteristics of human vision. Information capacity of the senses. Motor performance. Human sensitivities to environmental states and change. 3 lectures. Prerequisite: Psy 202

Psy 401 Social Psychology (3)

Human behavior as a product of interaction and social process, nature of group life in relation to social groupings, social conflict, public opinion, group morale, social controls, leadership. 3 lectures. Prerequisite: Psy 202 or permission of instructor.

Psy 432 Psychological Testing (3)

Principles and procedures of the selection, the administration, scoring, and the interpretation of achievement tests, aptitude tests including scholastic aptitude, interest inventories, and personality inventories. 3 lectures. Prerequisite: 9 units of psychology.

Psy 433 Individual Intelligence Testing (4)

Principles and procedures of individual intelligence testing. Supervised experience in the administration and scoring of individual intelligence tests. 2 lectures. 2 activity periods. Prerequisite: Psy 432

Psy 434 Interpreting Individual Psychological Tests (4)

Administration, scoring, and interpretation of the Stanford-Binet Intelligence Scale and the Wechsler scales. Additional tests and collection of non-test data for meaningful educational diagnoses and recommendations to teachers and parents. 2 lectures, 4 hours supervised field experience minimum. Prerequisite: Psy 433

Psy 435 Testing Exceptional Children (4)

Testing of exceptional children to determine learning difficulties, intelligence, mental and emotional characteristics. Preparation of case studies. Screening children for programs for exceptional children. Techniques for assessing psychological traits of culturally different children. 2 lectures, 4 hours supervised field experience minimum. Prerequisite: Psy 434

Psy 454 Dynamics of Individual Behavior (3)

Personality theory and research; human motivation. Directed toward helping the individual utilize this knowledge in his vocation. 3 lectures. Prerequisite: 6 units of psychology.

Psy 455 Psychology of Learning (3)

Principles, major theories, methods, and research findings relevant to major experimental areas of learning and motivation. Derivation of principles from research data, current research contributions, and implications for applied problems. 3 lectures. Prerequisite: 6 units of psychology.

SOCIAL SCIENCES

Soc Sc 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

Soc Sc 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of the department head.

Soc Sc 440 Supervised Field Work (3)

Supervised observation, research and work in community organizations, public agencies, with attention to the barrio and ghetto. Prerequisite: Senior standing and permission of instructor.

Soc Sc 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time. Prerequisite: Senior standing or consent of instructor.

Soc Sc 463 Undergraduate Seminar (2)

Intensive study of selected social problems with application of techniques for analysis. 2 meetings. Prerequisite: Soc Sc 461, 462 or consent of instructor.

Soc Sc 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

Soc Sc 511 Sources in Social Sciences (3)

Methods of finding and adapting authoritative source materials in the social sciences to the elementary, junior, and senior classroom situation. 3 lectures. Prerequisite: Graduate standing.

Soc Sc 521 Curriculum and Methods in Secondary Social Studies (3)

Content, organization and scope of social studies curriculum in secondary schools, methods of teaching. Evaluation of procedures. 3 meetings. Prerequisite: Major or minor in Social Sciences, admission to teacher education program and graduate standing.

Soc Sc 590 Seminar in Social Sciences (3)

Special problems in selected areas of the Social Sciences. Each seminar will have a subtitle describing its nature and content. 3 lectures. Maximum of 9 units may be earned. Prerequisite: Graduate standing and consent of instructor.

SOCIOLOGY

Soc 105 Introduction to Sociology (3)

Orientation to the nature of the study of society; survey of approaches to social analysis. Emphasis upon primary concepts describing environment, social structure, and social change for increased understanding of human relations. An overview of the systems of social relationships. 3 lectures.

Soc 106 Social Problems (3)

An appraisal of various factors from which social problems of the contemporary American society emerge and alternative procedures for dealing with such problems. 3 lectures.

Soc 201, 202, 203 Principles of Sociology (3) (3) (3)

Sources of materials and methods of sociological study; concepts and principles; structure and process of group life; social institutions. Applications of techniques in field study. 3 lectures.

Sociology

Soc 206 The Sociology of Family Life (3)

Description and analysis of the social relationships within the family group. Examination of alternative solutions to problems which arise in family living. 3 lectures.

Soc 301 Social Welfare in the U.S. (3)

Introduction to the field of social welfare; the development of American social work; scope and diversity of specific programs designed to meet welfare problems in contemporary society. 3 lectures. Prerequisite: 9 hours of sociology or consent of instructor.

Soc 302 Social Work (3)

Development of public welfare services; current problems and policy issues; analysis of current programs of social insurance, public assistance programs; inter-agency relationships. 3 lectures. Prerequisite: Soc 301

Soc 313 Urban Sociology (3)

Structure of social relationships in the community; physical structure of communities; patterns of community cooperation and conflict; changing patterns of urban community life; social class and political influence on the community level. 3 lectures. Prerequisite: One quarter of sociology or consent of instructor.

Soc 315 Race Relations (3)

Structure of relationships among ethnic and racial groups. Sources of discrimination and prejudice in personality and social structure. Patterns of segregation. Evaluation of current techniques for restructuring intergroup relations. 3 lectures. Prerequisite: Eth S 114; 6 hours of sociology or consent of instructor.

Soc 316 American Minorities (3)

Problems in assimilation of the Afro-American, Mexican-American, and American Indian. Analysis of internal group structures and external factors impeding assimilation of these minorities. Dynamics of intergroup relationships. Assessment of current programs aimed at assimilation. 3 lectures. Prerequisite: Six units of Sociology or consent of instructor.

Soc 323 Social Stratification (3)

Social class and the distribution of status and power in society, with emphasis on contemporary United States; social mobility; relationships of stratification to mental illness, race, family systems, crime and delinquency, etc. 3 lectures. Prerequisite: 6 hours of sociology or consent of instructor.

Soc 330 Social Change (3)

Description and analysis of social change in contemporary American society as it relates to major revolutionary changes in this century; variables alleged to affect social change; impact of social change upon traditional societies; prospects for future social change. 3 lectures. Prerequisite: 6 units of Sociology.

Soc 344 Sociology of Poverty (3)

Variable indications of poverty in modern society. Chief features of the subculture of the poor. Analysis of different explanations for the persistence of poverty. Survey of proposals for reducing poverty. 3 lectures. Prerequisite: College course in sociology or consent of instructor.

Soc 402 Crime and Delinquency (3)

Theories of delinquent and criminal behavior; analysis of institutional and other approaches to rehabilitation of criminals and delinquents. 3 lectures. Prerequisite: Two courses in sociology or consent of instructor.

Soc 413 Methods of Social Work (3)

Theories, concepts, values stressed in social work. Social casework. Principles and practices used by social workers serving individuals and families in correctional, public assistance, medical, psychiatric youth services, and other settings. Discussion of case material and available literature. 3 lectures. Prerequisite: Soc 302

Soc 421 Social Theory (3)

Analysis of the nature and types of classical and contemporary sociological and anthropological theory. 3 lectures. Prerequisite: Soc 203

Soc 431 Population Problems (3)

Description and analysis of population variables and their sociological consequences. 3 lectures. Prerequisite: Soc 105 and Stat 211

SOIL SCIENCE**SS 121 Soils (4)**

Physical, chemical, and biological properties of soils as related to agriculture. 3 lectures, 1 laboratory.

SS 122 Soil Management (4)

Effect of tillage, manuring, drainage, and irrigation practices on soil productivity. 3 lectures, 1 laboratory. Prerequisite: SS 121

SS 123 Soil Materials (3)

Origin, composition, and identification of rocks, minerals, and other materials important in the development of soils. Land forms as related to the nature and properties of soils. 2 lectures, 1 laboratory. Prerequisite: SS 121

SS 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

SS 202 Soil Conservation (3)

Climate, topography, soils and land use in relation to soil and water losses. Evaluation of soil and water conservation programs and practices. 3 lectures. Prerequisite: SS 121 or consent of instructor.

SS 221 Fertilizers (4)

Composition, value, and use of fertilizer materials and soil correctives. Methods employed in the manufacture, distribution, and application of fertilizers. 3 lectures, 1 laboratory. Prerequisite: SS 121

SS 230 General Soils (3)

Properties of soils, management and conservation practices required for the utilization of soil as a natural resource to produce food and fiber. For students outside the field of soil science. Not open to students with credit in SS 121. 3 lectures.

SS 321 Soil Classification (4)

Systems used in soil and land classification. Methods employed in soil surveying. Mapping of assigned areas and the preparation of survey reports. 3 lectures, 1 laboratory. Prerequisite: SS 122

SS 322 Soil Fertility (3)

Plant nutrient requirements of crops. Effect of soil and climatic conditions on the availability of nutrients in the soil. Diagnostic techniques in soils and crops. 2 lectures, 1 laboratory. Prerequisite: SS 122, 221, Chem 122

SS 332 Conservation Techniques (3)

Basic development of subject matter, materials, and activities for classroom instruction in soils, water, range, woodland, and recreation resources. 2 lectures, 1 laboratory.

SS 333 Tropical Soils (4)

Nature and properties of tropical soils, their origin, morphology, classification, fertility, utilization, and conservation. 3 lectures, 1 laboratory.

SS 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

Soil Science

SS 422 Soil Microbiology (3)

Biochemical activities of soil organisms. Effect of soil organisms on the formation, characteristics, and productivity of soils. Methods of studying soil organisms. 2 lectures, 1 laboratory. Prerequisite: SS 122, 221, Bact 221 or consent of instructor.

SS 423 Soil Chemistry (3)

Fundamental concepts and practices in soil chemistry. Methods of analysis and interpretation of significant investigations for the management of soils. 2 lectures, 1 laboratory. Prerequisite: SS 322 or consent of instructor.

SS 432 Soil Physics (4)

Advanced study of the physical properties of soils. Application of physical-chemical soil relationships to farming and engineering practices. 2 lectures, 2 laboratories. Prerequisite: SS 122, Phys 104, Chem 122, or consent of instructor.

SS 433 Land Use Planning (3)

Evaluation of land use capabilities. Development of plans and practices for the management of crop, range, and forest land. 2 lectures, 1 laboratory. Prerequisite: SS 321

SS 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

SS 463 Undergraduate Seminar (2)

Review of current research, experiments, and problems related to the students' major field of interest. Preparation and presentation of reports on problems or research activities. 2 lectures.

SS 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

SS 508 Conservation Legislation (3)

Legislation enabling and implementing conservation programs. Legal responsibilities of individuals and groups in the development of natural resources. Proposed or needed legislation for more effective conservation. 3 lectures. Prerequisite: Senior or graduate standing.

SS 521 Soil Morphology (3)

Advanced study of the morphological characteristics of soils. New techniques used in modern systems of soil classification and mapping. 2 lectures, 1 laboratory. Prerequisite: Graduate standing, SS 202, 321, 433

SS 530 General Soils (3)

For graduate students. Lectures same as SS 230 with additional requirements placed on student to relate the information to his own major field via written reports. 3 lectures.

SS 581 Graduate Seminar in Soils (3)

A review of current research, experiments and problems related to soil science. Development of special demonstration and field plot trials for educational groups. 3 lectures.

SS 582 Graduate Seminar in Land Management (3)

Development of plans and practices for the management of crop, range, and wood land. 2 lectures, 1 laboratory. Prerequisite: Graduate standing, SS 433, Cr Sc 411 or equivalent.

SS 599 Thesis or Internship (3) (3) (3)

Problems and topics in advanced soil conservation according to interests and needs of the students enrolled. Prerequisite: Graduate standing in soil conservation.

SPANISH

Span 101, 102, 103 Elementary Spanish (4) (4) (4)

For beginners. Class practice in pronunciation, sentence structure, reading, writing, and basic conversation. Laboratory drill with recorded materials. 3 lectures, 1 two-hour laboratory.

Span 104 Intensive Elementary Spanish (12)

Class practice in pronunciation, syntax, reading, writing, and conversation. Offered in summer only. 9 lectures, 3 two-hour laboratories.

Span 201, 202, 203 Intermediate Spanish (3) (3) (3)

Further practice in speaking, reading, and writing Spanish. Introduction to Spanish and Latin American cultures. 3 lectures. Prerequisite: Span 103 or equivalent.

Span 251, 252, 253 Barrio Spanish (3)

Accelerated oral approach to everyday communication with Spanish speaking people, particularly school age children. 3 lectures. Prerequisite: Junior standing, some experience in Spanish, approval of the instructor.

Span 301 Significant Writers in Spanish (4)

Study in depth of selected Spanish writers, as individual writers or in groups. 4 lectures. Prerequisite: Span 203 or equivalent.

Span 324 Spanish Translation (3)

Translation from Spanish to English and vice versa to help Spanish speaking students improve their language usage. 3 lectures. Prerequisite: Span 203, 353, or equivalent.

SPEECH

Sp 111 Professional Fields of Speech (1)

Occupational opportunities, professional organizations, and important journals in the various fields of speech. Development and trends in forensics, discussion, theater arts, and speech correction. 1 lecture.

Sp 200 Principles of Speech (3)

Introduction to the fundamentals and principles which underlie effective speech communication. Practical experience in various types of speaking situations: informative speaking, persuasive speaking, oral reporting, and panel discussion. 3 lectures.

Sp 202 Advanced Public Speaking (2)

Practice in the composition and delivery of various types of speeches. Emphasis on speeches related to the student's vocational objective. 1 lecture, 1 two-hour laboratory. Prerequisite: Sp 200

Sp 214 Communication Theory (4)

Concepts and theories of the human communication process. Psycho-sociological theories and concepts of attitude change, the communication process in human relations. 4 lectures. Prerequisite: Sp 200; Psy 202

Sp 215 Argumentation (4)

Analysis of evidence and reasoning. Preparation and delivery of speeches based on logical proof. Practice in refutation. 4 lectures. Prerequisite: Sp 200 or consent of instructor.

Sp 217 Essentials of Discussion (4)

Basic principles and techniques of discussion. Survey of the importance of discussion in contemporary society, including a study of and practice in informal group discussion, panel discussion, symposium, and forum. 4 lectures. Prerequisite: Sp 200

Speech

Sp 300 Forensic Activity (1)

Participation in intercollegiate forensic activities. Any student who expects to participate in such activities during the quarter should enroll. Specific assignments will be determined by instructor. May be repeated to 6 units. 1 activity.

Sp 301 Debate (4)

Techniques of argumentation and their application to debate; logic and reasoning; fallacies of reasoning; experience in various forms of formal argument, including intercollegiate debate; judging and debate program administration. 4 lectures. Prerequisite: Sp 200

Sp 302 Introduction to Speech Pathology (4)

Survey of speech disorders emphasizing causes, symptoms, and treatment of functional defects; preparation of records and case studies; role of the speech therapist in the community and in public schools; role of the public school teacher in speech improvement. 4 lectures.



Sp 304 Persuasion (4)

Basic theory of persuasive speaking; methods of attention, suggestion, motivation and adaptation as applied to speechmaking for the influencing of group opinion and action; emphasis on logical, emotional and ethical processes; presentation of speeches using persuasive methods. 4 lectures. Prerequisite: Sp 202 or Sp 215

Sp 305 Oral Interpretation (4)

Basic theory of interpretation; selection, preparation, and presentation of material for oral reading. 4 lectures. Prerequisite: Sp 200

Sp 306 Voice and Phonetics (4)

Physiological and anatomical bases of normal voice production. Phonetics as a basis of correct sound formation and standards of pronunciation. Concentration on special skills of enunciation, articulation, and voice improvement. 4 lectures.

Sp 308 Industrial and Professional Speech (3)

Speech in industrial, professional, and informal business including interviews, sales talks, and conference speaking. 3 lectures. Prerequisite: Sp 200

Sp 311 Cross Cultural Communication (3)

Techniques for identification and correction of communication problems within and among ethnic groups. 3 lectures. Prerequisite: Sp 200

Sp 313 The Development of Speech and Language (4)

Development of speech and language from birth to adolescence. Physical and psychological processes contributing to the emergence, practice, and mastery of speech and language. 4 lectures. Prerequisite: Sp 200, 302, 306

Sp 317 Rhetoric: Classical Period to Renaissance (4)

Early development of rhetorical theory in Greco-Roman civilization; analysis of the canons of rhetoric; rhetorical thought of Plato, Aristotle, the ad Herennium, Cicero, Quintilian. Medieval and Renaissance contributions: Augustine, Anselm, Abelard, Dante, John of Salisbury, and Cox. 4 lectures. Prerequisite: Sp 304

Sp 318 Rhetoric: Renaissance to the Present (4)

Application of classical theory to modern concepts of rhetoric; contributions of Cox, Wilson, Bacon, Sheridan, Walker, Campbell, Whately, Blair, Adams, Goodrich, Jebb; twentieth century rhetorical studies including Brigrance, Winans, Burke; the Semanticists; contemporary speech textbook writers. 4 lectures. Prerequisite: Sp 304

Sp 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of instructor.

Sp 401 Current Methods in Speech Pathology (4)

Current procedures and rationales in the management of speech disorders. Familiarization with instrumentation, testing, and methodology. 3 lectures, 1 two-hour laboratory. Prerequisite: Sp 302

Sp 402 Introduction to Audiology (4)

Anatomy and physiology of the hearing mechanism. The hearing process. Familiarization with differing types of hearing disorders. Instrumentation and testing. Methods of rehabilitation. 4 lectures. Prerequisite: Sp 302

Sp 403 Discussion and Conference Leadership (3)

Relationship of human behavioral dynamics to the discussion process; critical thinking, role of leadership in the group process; participation in group dynamics, discussion forms in a business-industrial context. 3 lectures. Prerequisite: Sp 217 and Junior standing.

Sp 405 Advanced Oral Interpretation (3)

Choral reading, reader's theater, and special projects. 3 lectures. Prerequisite: Sp 305

Sp 408 American Public Address (4)

Historical survey to 1865; evaluation of great speakers and speeches as they pertain to the development of American institutions. 4 lectures. Prerequisite: Sp 304, or consent of instructor.

Sp 409 American Public Address (4)

Historical survey from 1865 to present; evaluation of great speakers and speeches as they pertain to the development of American institutions. 4 lectures. Prerequisite: Sp 304, or consent of instructor.

Sp 411 Communication Research (4)

Communication research strategy and methodology. Scientific process, bases for derivation and verification of hypotheses, and basic methods of designing research in communication. 4 lectures. Prerequisite: Sp 214

Statistics

Sp 461 Senior Project (2)

Selection and completion of a project under faculty supervision. Projects typify problems which a graduate may face in his field of employment. Project results are presented in a formal written report. Minimum 60 hours total time.

Sp 463 Undergraduate Seminar (2)

Discussion of individual projects, oral reports on material in current professional writings. 2 lectures. Prerequisite: Senior standing.

Sp 511 Rhetorical Theory (3)

Analytical survey of the major contributions of rhetorical authorities; the application of these contributions to current public speaking. 3 lectures.

Sp 521 Curriculum and Methods in Speech (3)

Curricula, methods, and procedures that may be used effectively in teaching speech classes and directing speech activities in secondary schools. Selection and organization of teaching material. 3 lectures. Prerequisite: Admission to teacher education program and graduate status.

Sp 590 Seminar in Speech (1-3)

Readings and papers on special problems in selected areas of speech. Total credit limited to 6 units. 1-3 lectures. Prerequisite: Graduate status.

STATISTICS

Stat 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: permission of department head

Stat 211 Elementary Probability and Statistics (3)

Classification of statistical data; calculation and uses of various averages; measures of variability; permutations, combinations, and elementary probability; binomial and normal distributions; random sampling, confidence limits. 3 lectures. Prerequisite: Intermediate Algebra or equivalent.

Stat 212 Statistical Methods (3)

Tests of hypotheses, confidence intervals; nonparametric methods; linear regression and correlation; chi-square and F-distributions; index numbers; time series; analysis of variance. 3 lectures. Prerequisite: Stat 211

Stat 313 Analysis of Variance (3)

Applications of statistics for students not majoring in statistics or mathematics. Analysis of variance including the one-way classification, randomized blocks, latin squares, and factorial designs. Introduction to analysis of covariance. 3 lectures. Prerequisite: Stat 212

Stat 321, 322, 323 Statistical Analysis (3) (3) (3)

Use of the more common discrete (binomial, Poisson, hypergeometric) and continuous (normal, Student's t, chi-square, Snedecor's F) probability distributions. Parametric hypothesis testing and estimation. Topics from linear regression and correlation, analysis of variance, analysis of covariance, and non-parametric methods. High speed computation is used throughout. 3 lectures. Prerequisite: Math 132 or 142, ability to program in Fortran.

Stat 330 Statistical Uses of Computers (3)

Techniques available to the statistician for efficient use of a digital computer to perform statistical computations and to handle large amounts of data. Use of special languages. Analysis of library programs. 3 lectures. Prerequisite: Stat 313 or 323, CSc 101

Stat 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with not more than 2 units in any one quarter. Prerequisite: permission of department head.

Stat 421 Sampling Theory (3)

Planning, execution, and analysis of sampling from finite populations. Simple, stratified, multi-stage and systematic sampling. Nonsampling errors. 3 lectures. Prerequisite: Stat 322

Stat 424 Design of Experiments (3)

Multiple and partial regression and correlation; advanced topics in analysis of variance including split-plot designs, confounding, missing data, orthogonal and non-orthogonal contrasts, unequal subclass numbers; analysis of covariance. 3 lectures. Prerequisite: Stat 323, Math 312

Stat 425 Probability Theory and Applications I (3)

Basic probability theory, conditional and marginal probability, stochastic independence, probability models for random phenomena, distribution functions, expectation of a function with respect to a probability function. 3 lectures. Prerequisite: Stat 322

Stat 426 Probability Theory and Applications II (3)

Binomial, Poisson, geometric, negative-binomial, normal, beta and gamma probability functions, transformations. Probability functions of sums of independent random variables. Characteristic functions. Stochastic processes. 3 lectures. Prerequisite: Stat 425

Stat 445 Mathematical Statistics (3)

Investigation of statistical theory, including the topics of estimation, testing hypotheses, multivariate normal distribution, regression and linear hypotheses, and non-parametric methods. 3 lectures. Prerequisite: Stat 426

Stat 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

Stat 463 Undergraduate Seminar (2)

Reports and discussions by students through seminar methods, based on topics of interest to persons preparing for a career in statistics. 2 activity periods.

Stat 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: consent of instructor

Stat 511 Elementary Probability and Statistics (3)

For graduate students. Lectures same as Stat 211. Applications of statistics in the student's major field. 3 lectures.

Stat 512 Statistical Methods (3)

For graduate students. Lectures same as Stat 212. Applications of statistics in the student's major field. 3 lectures. Prerequisite: Stat 511

Stat 513 Analysis of Variance (3)

For graduate students. Lectures same as Stat 313. Applications of statistics in the student's major field. 3 lectures. Prerequisite: Stat 212 or 512

Stat 527 Theory and Applications of Statistics (3)

Discrete and continuous random variables, expected values and moments, moment generating functions, multivariate distributions, sampling, sampling distributions, interval estimation, tests of hypotheses. 3 lectures. Prerequisite: Stat 322

Statistics

Stat 528 Theory and Applications of Statistics (3)

Multivariate normal distribution, sampling distributions, interval estimation, tests of hypotheses, regression and linear hypotheses, experimental design models, and non-parametric methods. 3 lectures. Prerequisite: Stat 527

Stat 540 Foundations in Statistics (3)

Intensive foundation course for the MBA program. Selected elements of descriptive, analytical, and inferential statistics to provide tools for research and decision making in business and economics. 3 lectures. Prerequisite: Graduate standing.

TRANSPORTATION ENGINEERING

TE 121 Transportation Fundamentals (2)

The transportation engineering profession. Engineering approach to problem solving. Analysis of land, air, and water transportation systems. Basic nomenclature and design criteria used in the field. Applications to specific problems. Discussions with practicing engineers on subjects of current interest. 2 lectures.

TE 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Permission of department head.

TE 240 Additional Engineering Laboratory (1-2)

Total credit limited to 4 units, with not more than 2 units in any one quarter. 1 or 2 laboratories.

TE 321 Introduction to Traffic Problems and Transportation (4)

Elements of ground and water traffic circulation and planning. Driver and vehicle performance. Traffic analysis and control. Planning of air, water and ground transportation units and terminals as elements of complete transportation systems. 3 lecture-discussions, 1 laboratory. Prerequisite: IE 304, Stat 322



TE 322, 323 Structural Analysis (3) (3)

General structural theorems, energy methods, influence diagrams, deflection of structures, analysis of statically determinate and indeterminate structures. Introduction to matrix methods of analysis and dynamic response. 3 lectures. Prerequisite: Aero 207, 229

TE 324 Traffic Engineering—Operations and Controls (4)

Techniques for making traffic engineering investigations; traffic laws and ordinances, speed regulation, curb parking regulations, through controls, one-way streets, right-of-way regulations; design and application of signs, markings, lighting; and traffic engineering. 3 lecture-discussions, 1 laboratory. Prerequisite: TE 321 or equivalent.

TE 329 Transportation Materials (3)

Experimental determination of mechanical properties of concrete, asphalt, and soils as required for engineering applications. Experimental verification of assumptions made in mechanics of materials procedures. Use of strain measuring devices. Preparation of technical reports. 1 lecture. 2 laboratories. Prerequisite: Aero 207, 229

TE 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

TE 421 Highway and Airfield Pavement Design (4)

Theories, principles, and procedures in the structural design of highway and airfield pavements. Design of rigid and flexible pavements. Construction and maintenance procedures for pavements and stabilized bases. 3 lecture-discussions, 1 laboratory. Prerequisite: TE 329

TE 422 Geometric Design of Highways (4)

Location and safe geometric design of highway and other transportation facilities. Earthwork and drainage related to highway, railway, dock, and airport design. Theory and practice in design of alignments, highway cross-sections, intersections, interchanges, and freeways in urban and rural areas. 3 lecture-discussions, 1 laboratory. Prerequisite: TE 321, 329

TE 423 Structural Steel Design (4)

Design and behavior of the elements of steel structures. Proportioning of members and connections. Introduction to plastic design. 2 lecture-discussions, 2 laboratories. Prerequisite: ArcE 404, TE 329. Concurrent: ME 349

TE 433 Transportation Systems Planning (4)

Planning of urban and statewide transportation systems. Air, water, rail, highway, and pipeline systems separately and in combination. Selection of routes and types of systems based on economic, social, technological, and other characteristics. Planning of terminals for all types of transportation systems. 3 lecture-discussions, 1 laboratory. Prerequisite: CRP 211, IE 403, TE 321, Ec 212

TE 461, 462 Senior Project (2) (2)

Selection and completion of a project which is typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time. Prerequisite: TE 421, 422

TE 463 Undergraduate Seminar (2)

New developments, policies, practices, and procedures discussed in seminar sessions. Each individual is responsible for the development and effective presentation of topics in his area of emphasis. 2 meetings. Prerequisite: Senior standing.

TE 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

VEGETABLE SCIENCE

Vg Sc 230 General Vegetable Crops (4)

Principles involved in production, harvesting, packaging, and marketing of major California vegetable crops. Survey of the vegetable industry for other than crop science majors. Credit not allowed for both Vg Sc 230 and Vg Sc 232. 3 lectures, 1 laboratory.

Veterinary Science

Vg Sc 232 Vegetable Crops Production (4)

Production, adaptation, utilization of vegetable crops such as cole crops, beans, celery, peppers, squash, melons, cucumbers, lettuce, carrots, spinach, sweet potatoes. Credit not allowed for both Vg Sc 230 and Vg Sc 232. 3 lectures, 1 laboratory. Prerequisite: Cr Sc 131



Vg Sc 324 Harvesting, Packaging and Marketing Vegetable Crops (4)

Harvesting methods and procedures; current handling and packaging techniques; containers; storage; and grades, grading and laboratory tests for fresh market vegetables. 3 lectures, 1 laboratory. Prerequisite: Vg Sc 232

Vg Sc 326 Advanced Vegetable Production (4)

Advanced studies of recent developments and problems of vegetable production. Cultural practices associated with mechanization. 3 lectures, 1 laboratory. Prerequisite: Cr Sc 131, 133 or Vg Sc 230

Vg Sc 424 Vegetable Crop Management (4)

Organization, management, and operation of commercial size vegetable production acreages; advanced work in production, harvesting, marketing operations, and the varied aspects of the entire commercial vegetable production industry. 3 lectures, 1 laboratory. Prerequisite: Cr Sc 131, 133 or Vg Sc 232

Vg Sc 521 Advanced Vegetable Science (4)

Problems and techniques of vegetable science. Special study projects. 3 lectures, 1 laboratory. Prerequisite: Graduate standing and permission of instructor.

VETERINARY SCIENCE

VS 100 Principles of Veterinary Science (5)

Structural aspects and functions of the principal systems of farm animals, control and prevention of common diseases causing economic losses in livestock. 4 lectures, 1 laboratory. To be taken by technical students only, in substitution for VS 123, 302 and 203. Not open to degree students for degree credit. Prerequisite: Bio 100 or 101

VS 123 Anatomy and Physiology (3)

Structural aspects and the normal functions of the principal systems of the various farm animals. 2 lectures, 1 laboratory. Prerequisite: Zoo 131, 132

VS 203 Animal Parasitology (3)

Identification, life cycles, prevention and control of the common external and internal parasites causing economic loss in livestock. 3 lectures. Prerequisite: Zoo 131, 132

VS 206 Laboratory Animal Care (3)

Applied principles involving care and management of laboratory farm animals, veterinary principles involving the care of animals with injury and disease. 3 lectures. Prerequisite: VS 123

VS 302 Animal Hygiene (3)

Basic disease concepts, transmission of infectious diseases, fundamentals of immunology. Infectious disease preventive principles. The livestock producer's role and responsibilities in governmental farm animal disease control programs. 3 lectures. Prerequisite: Bact 221

VS 310 Zoonosis (2)

A study of some of the common diseases of domestic animals and birds which can be transmitted to man. 2 lectures. Prerequisite: Zoo 131, Bact 221

VS 432 Animal Pathology (4)

Gross and microscopic study of disease and parasitic lesions involving meat animal tissues. Traumatic, infectious, and parasitic lesions bearing public health significance. 3 lectures, 1 laboratory. Prerequisite: VS 302 or consent of instructor.

VS 435 Meat Inspection (4)

Organization of federal and state meat inspection services; definition of regulations established by codes and laws. Laboratory work in principles and procedures of meat inspection. 3 lectures, 1 laboratory. Prerequisite: FI 210, VS 302

VS 522 Seminar in Disease Problems (2)

Farm livestock disease problems related to the specific countries of Latin America, Africa, Middle East and Asia. Familiarization with governmental control, prevention and eradication programs for the common and principal diseases unique to individual countries; also familiarization with special testing procedures in various governmental programs. 2 lectures. Prerequisite: VS 302.

WELDING

Weld 141 Manufacturing Processes (1)

Theory, practice, and application of metal joining processes including oxyacetylene, resistance, tungsten-inert-gas, metallic-inert-gas, aluminum brazing and silver alloy brazing. Mechanical tests of welded joints and related reports. 1 laboratory.

Weld 142 Manufacturing Processes (1)

Theory and practice in metal cutting and arc welding processes. Electrode manufacture, classification, and application. Welded joint design. Introduction to codes, testing, joint strength. Mechanical tests of welded joints and related reports. Application of process to industrial uses. 1 laboratory.

Weld 144 Manufacturing Processes (2)

A combination of Weld 141 and Weld 142. Allows the student to complete two units of manufacturing processes welding in one quarter. 2 laboratories.

Weld 145 Macro and Micro Bonding (2)

Fusion welding, brazing and resistance welding of sheet steel. Gas tungsten arc process for aluminum. Micro-bonding systems for electronic circuitry. Joint testing. 2 laboratories.

Welding/Zoology

Weld 151 Micro Bonding (1)

Joining processes related to microelectronics. Thermocompression bonding of leads for thick and thin film circuits, soldering, plasma needle arc welding. Development of weld schedule and fabrication of welded electronic module. 1 laboratory. Prerequisite: Weld 141

Weld 155 Fundamentals of Metallic Arc Welding (1)

Shielded metallic arc welding including vertical position. Expansion, contraction, distortion, and residual stresses as applied to welded structures. Various joint types including lap, fillets, and butt joints. 1 laboratory. Prerequisite: Weld 142

Weld 156 Fundamentals of Metallic Arc Welding (1)

Shielded metallic arc welding of steel plates. Includes butt welding, backing materials, hard surfacing, and cast iron welding. Basic weld tests. Welding of light-gauge steel. 1 laboratory. Prerequisite: Weld 155

Weld 235 Nondestructive Testing (5)

Application of nondestructive test systems for quality control of welded structures and castings. Includes radiography, ultrasonic, magnetic particle, penetrants, and eddy current methods. 3 lectures, 2 laboratories. Prerequisite: Weld 359

Weld 236 Welding Power Sources (3)

Design, selection, and application of welding power sources. Physics of the welding arc as related to power supply. 2 lectures, 1 laboratory. Prerequisite: Weld 235

Weld 251, 252 Materials Acceptance Methods (1) (1)

Nondestructive testing, theory and techniques, including industrial X-ray, ultrasonic, and dye penetrants. Metals processing techniques, joining, working and testing. 1 laboratory.

Weld 324, 325, 326 Advanced Welding Technology (5) (4) (4)

Problems in welding carbon and low alloy steels, loads, and stresses. Difficulties and corrective measures. Problems in welding of nonferrous metals and alloys. Selection of joining processes. Welding metallography. 3 or 2 lectures, 2 laboratories. Prerequisite: Weld 236

Weld 359 Advanced Welding (1)

The application of the inert-gas shielded arc welding process to the hard-to-weld metals, including aluminum and stainless steel, and titanium. Argon and helium as gas shields. 1 laboratory. Prerequisite: Weld 141, 142

Weld 434, 435, 436 Welding Design (3) (3) (3)

Design of welded structures, containers, bases, tanks and pressure vessels according to governing codes, specifications and procedures, cost estimating of steel fabrication, process selection and evaluation. 1 lecture, 2 laboratories. Prerequisite: Weld 326

ZOOLOGY

Zoo 131 General Zoology (4)

Cells, tissues, and organ systems of vertebrates; emphasis on man and domestic animals. 2 lectures, 2 laboratories.

Zoo 132 General Zoology (4)

Embryology, genetics, taxonomy, economic zoology, ecology and evolution. 2 lectures, 2 laboratories. Prerequisite: Zoo 131

Zoo 133 General Zoology (4)

The variety, structure and distribution of animals. 2 lectures, 2 laboratories. Prerequisite: Zoo 132

Zoo 303 Vertebrate Embryology (3)

The developmental processes from the egg to the formation of the body and the establishment of the principal organs and systems. 3 lectures. Prerequisite: Zoo 132

Zoo 321 Mammalogy (4)

Identification, life histories, and economic importance of mammals, with special reference to California species. 2 lectures, 2 laboratories. Prerequisite: Zoo 132 or Bio 129

Zoo 322 Biology of Fishes (4)

Identification, physiology, anatomy, and behavior of marine and freshwater fishes with special reference to local and economically important species. 2 lectures, 2 laboratories. Prerequisite: Zoo 132

Zoo 323 Ornithology (4)

Classification, anatomy and physiology, ecology and behavior, and economic importance of birds. 2 lectures, 2 laboratories. Prerequisite: Zoo 132 or Bio 129

Zoo 326 Comparative Anatomy of the Vertebrates (5)

Comparative structure of vertebrate organ systems. 3 lectures, 2 laboratories. Prerequisite: Zoo 132. Recommended: Zoo 303 and Zoo 353

Zoo 329 Vertebrate Field Zoology (4)

Identification and natural history of terrestrial vertebrates, with emphasis on field study of local forms. 2 lectures, 2 laboratories. Prerequisite: Zoo 132 or Bio 129

Zoo 336 Invertebrate Zoology (4)

Study of invertebrate groups of animals with emphasis on taxonomy, morphology, distribution and economic importance. 2 lectures, 2 laboratories, and field work. Prerequisite: Zoo 133 or Bio 129

Zoo 337, 338, 339 Human Anatomy and Physiology (3) (3) (3)

Morphology of man, with laboratory dissection of the cat. Functions of the various organ systems of man with appropriate laboratory experiments. Zoo 337 not open for credit to students who have completed Zoo 326, Comparative Anatomy. 2 lectures, 1 laboratory. Prerequisite: Zoo 132, elementary chemistry.

Zoo 340 Human Muscle Anatomy (2)

Study of the muscles of a human cadaver. 1 lecture, 1 laboratory. Prerequisite: Zoo 337 (may be taken concurrently)

Zoo 341 Herpetology (4)

Living and extinct reptiles and amphibians; an adaptive approach to their diversity, biology, and classification. 2 lectures, 2 laboratories. Prerequisite: Zoo 132

Zoo 353 Vertebrate Embryology Laboratory (2)

Study of the developmental anatomy of selected stages of the frog, chick and pig. Demonstrations and exercises in the preparation of embryonic materials for study purposes. 2 laboratories. Prerequisite: Zoo 303 (may be taken concurrently).

Zoo 412 Introduction to Clinical Pathology (3)

Malignant, deficiency, degenerative and other non-infectious diseases from the standpoint of etiology, manifestations and laboratory findings. 3 lectures. Prerequisite: Chem 328, Zoo 339 or Bio 431

Zoo 422 Histology (4)

Functional microscopic anatomy of principal tissues and organs of vertebrates. 2 lectures, 2 laboratories. Prerequisite: Zoo 132

Zoo 425 Parasitology (4)

External and internal parasites of man and animals; life history; parasite-host relationships; control and recognition of species of clinical importance. 2 lectures, 2 laboratories. Prerequisite: Zoo 132. Recommended: Zoo 133

Zoology

Zoo 426 Serology and Immunology (4)

Nature of innate and acquired immune reactions: theory and techniques of serological methods in diagnosing disease. Designed for preparing laboratory technologists. 2 lectures, 2 laboratories. Prerequisite: Consent of instructor.

Zoo 428 Hematology (4)

Microscopic and chemical examination of blood. Designed for preparing laboratory technologists. 2 lectures, 2 laboratories. Prerequisite: Consent of instructor. Recommended: Zoo 426

Zoo 432 Comparative Animal Physiology (4)

Physiological mechanisms involved in osmotic and ionic regulations, respiratory energetics and thermal acclimation. Laboratory experiments in physiological processes and their ecological importance. 2 lectures, 2 laboratories. Prerequisite: Bio 431

Zoo 524 Functional Vertebrate Morphology (3)

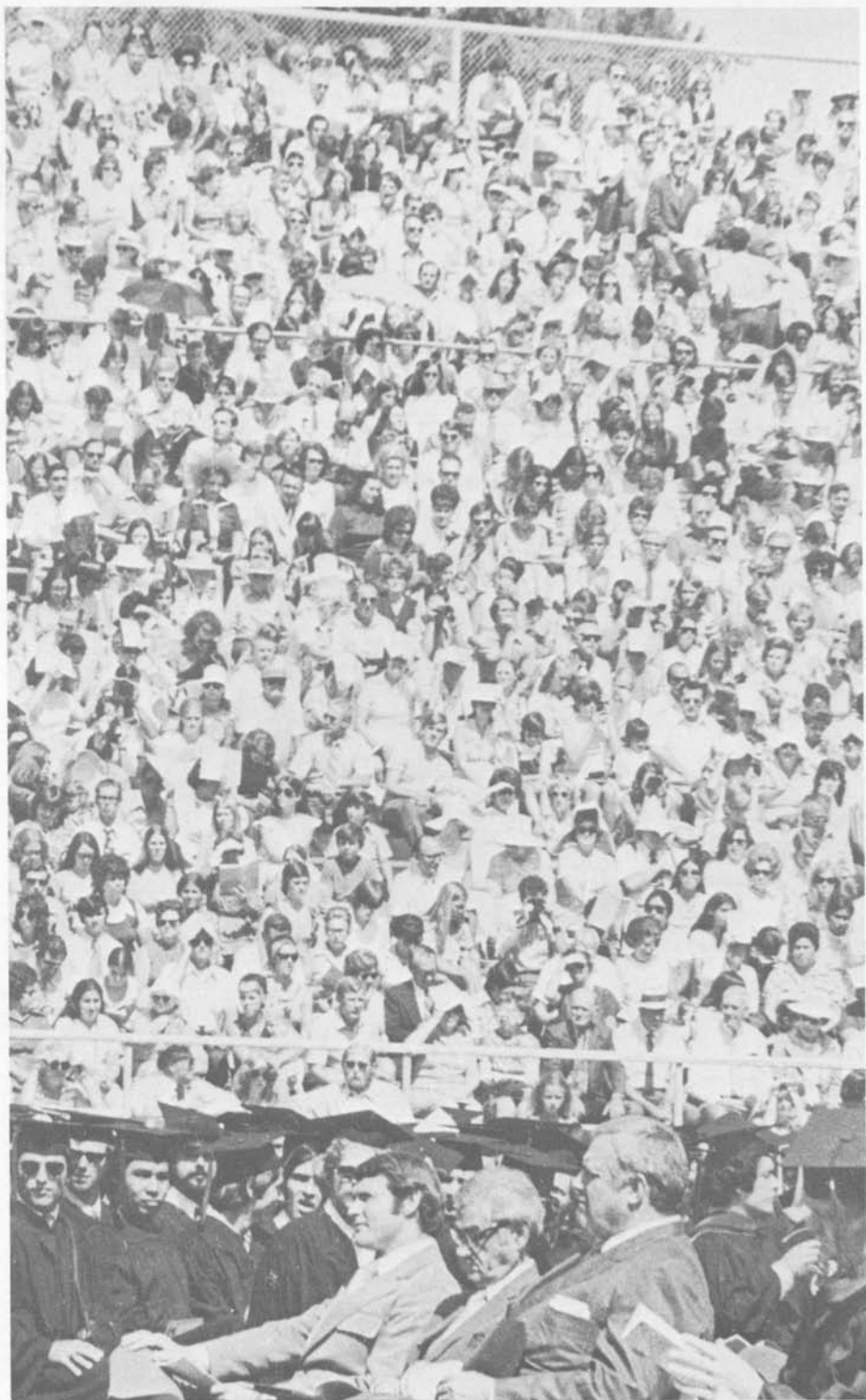
Discussion and critical evaluation of selections from the modern anatomical literature. Locomotor and feeding mechanisms. Dissections of skeleto-muscle mechanisms. 1 lecture, 2 laboratories. Prerequisite: Zoo 325 or consent of instructor. Recommended: Zoo 329

Zoo 590 Seminar in Zoology (1)

Problems and topics in advanced zoology selected according to the interest and needs of the students enrolled. Maximum of 3 units. 1 lecture. Prerequisite: Graduate status and evidence of satisfactory preparation in zoology.



DIRECTORIES



CALIFORNIA POLYTECHNIC STATE UNIVERSITY SAN LUIS OBISPO

EXECUTIVE

President.....	Robert E. Kennedy
Secretary to the President.....	Grace Arvidson
Executive Assistant to the President.....	Larry R. Voss
Academic Vice President.....	Dale W. Andrews
Administrative Vice President.....	Harold O. Wilson
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INSTRUCTION

Dean, School of Agriculture and Natural Resources.....	J. Cordner Gibson
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Dean, School of Architecture and Environmental Design.....	George Hasslein ✓
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Dean, School of Business and Social Sciences.....	Owen Servatius (Acting)
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Dean, School of Communicative Arts and Humanities.....	Jon M. Ericson
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Director, Institutional Research.....	Lowell H. Dunigan
Director, International Education.....	Robert E. McCorkle
Director, University Library.....	L. Harry Strauss

STUDENT AFFAIRS

Dean of Students.....	Everett M. Chandler
Assistant to the Dean of Students.....	Barney R. Timone
Associate Dean, Women.....	Lorraine H. Howard
Director, Activities.....	John D. Lawson
Director, Admissions, Records, and Evaluations.....	F. Jerald Holley
Admissions Officer.....	George R. Davies, II
Registrar.....	Gerald N. Panches
Director, Counseling and Testing.....	George Mulder
Director, Financial Aid.....	Lawrence Wolf
Director, Health Services.....	Billy W. Mounts
Director, Housing.....	Robert M. Bostrom
Director, Placement.....	Eugene A. Rittenhouse
Director, EOP Administrative Services.....	William C. Wallace
Director, EOP Counseling and Tutorial Services.....	Ernest Padilla

BUSINESS AFFAIRS

Director, Business Affairs	James R. Landreth
Administrative Assistant	Ray Pena
Accounting Officer	
Budget Officer	Joseph A. Surra
Chief of Plant Operations	Robert R. Adams, Jr.
Chief Security Officer	George W. Cockriel
Housing Manager	Raymond Baker
Procurement and Support Services Officer	Donald M. Vert
Supervisor of Grounds	Fred J. Blanck

FOUNDATION

Executive Director	Alfred Amaral
Controller	James A. Neal

ASSOCIATED STUDENTS, INC.

Director, Business Affairs	Roy Gersten
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DEPARTMENT HEADS

SCHOOL OF AGRICULTURE AND NATURAL RESOURCES

Agricultural Education	Osmund S. Gilbertson
Agricultural Engineering	Lloyd H. Lamouria
Agricultural Management	Edgar A. Hyer
Animal Science	Richard F. Johnson
Crop Science	Corwin M. Johnson
Dairy and Poultry Science	Harmon Toone
Food Industries	Thomas M. Lukes, Acting
Natural Resources Management	Marvin J. Whalls
Ornamental Horticulture	Howard C. Brown
Soil Science	C. Dean Piper
Veterinary Science	Wallace F. Glidden

SCHOOL OF ARCHITECTURE AND ENVIRONMENTAL DESIGN

Directors	William H. Brown, Paul R. Neel, William R. Phillips, Kenneth E. Schwartz
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SCHOOL OF BUSINESS AND SOCIAL SCIENCES

Business Administration	Owen L. Servatius
Economics	Fuad H. Tellev
Political Science	William M. Alexander
Social Sciences	Mahmud S. Hariri

SCHOOL OF COMMUNICATIVE ARTS AND HUMANITIES

Art	Bernice B. Loughran
English	Willard M. Pederson
Foreign Languages	Leonard Olguin
Graphic Communications	John B. Wordeman
History	Herman C. Voeltz
Journalism	John R. Healey
Music	Alexander Capurso
Philosophy	James T. Culbertson
Speech Communication	James R. Emmel

SCHOOL OF ENGINEERING AND TECHNOLOGY

Aeronautical Engineering.....	Charles P. Davis
Electronic and Electrical Engineering.....	E. R. Owen
Engineering Technology.....	James M. McGrath
Environmental Engineering.....	Walter E. Holtz
Industrial Engineering.....	Donald E. Morgan
Industrial Technology.....	J. M. McRobbie
Mechanical Engineering.....	John J. Kane
Metallurgical Engineering.....	Richard C. Wiley
Transportation Engineering.....	Andrew D. Jones

SCHOOL OF HUMAN DEVELOPMENT AND EDUCATION

Child Development.....	Margaret E. McGeever
Education.....	Walter P. Schroeder
Ethnic Studies.....	David J. Sanchez
Home Economics.....	Ruth H. James
Physical Education—Men.....	Robert A. Mott
Physical Education—Women.....	Mary Lou White
Psychology.....	L. Robert Sorensen

SCHOOL OF SCIENCE AND MATHEMATICS

Biological Sciences.....	Richard F. Nelson
Chemistry.....	William C. Langworthy
Computer Science and Statistics.....	Daniel F. Stubbs
Mathematics.....	Charles J. Hanks
Military Science.....	Col. William C. Black
Physics.....	Robert H. Frost

LIBRARY

Director, University Library.....	L. Harry Strauss
Head, Technical Services.....	Charles R. Beymer
Head, Public Services.....	Angelina Martinez

FACULTY EMERITI

(Dates indicate period of service)

John K. Allen (1952–1970).....	Veterinary Science
Olive M. Andersen (1957–1972).....	Mathematics
John H. Applegarth (1952–1972).....	Biological Sciences
Carl G. Beck (1932–1963).....	Farm Management
Lyman L. Bennion (1938–1967).....	Animal Husbandry
Ralph O. Bille (1948–1965).....	Agricultural Engineering
Robert O. Boothe (1954–1972).....	Foreign Languages
Frederick W. Bowden (1949–1972).....	Electronic and Electrical Engineering
Woodford E. Bows (1937–1973).....	Physics
Gene E. Brendlin (1950–1971).....	Farm Management
J. Philip Bromley (1947–1973).....	Agricultural Management
H. H. Burlingham (1948–1972).....	Agricultural Education
Arthur G. Butzbach (1950–1970).....	Education
James H. Carrington (1943–1967).....	Agricultural Engineering
Logan S. Carter (1947–1970).....	Soil Science
Spelman B. Collins (1940–1968).....	Animal Husbandry

A. Norman Cruikshanks (1947-1971)	Social Sciences
Harold P. Davidson (1936-1973)	Music
Charles A. Elston (1947-1973)	Mathematics
A. M. Fellows (1946-1966)	Printing Engineering and Management
George S. Furmisky (1955-1973)	Engineering Technology
Stanton Gray (1939-1960)	Crops
C. Herold Gregory (1950-1970)	Printing Technology and Management
Lester W. Gustafson (1947-1971)	Aeronautical Engineering
Lewis E. Hammitt (1946-1970)	Physics
Wilbur C. Hogan (1959-1973)	Philosophy
A. L. Houk (1946-1972)	Chemistry
LeRoy B. Hughes (1950-1971)	Physical Education
James J. Jensen (1948-1973)	Physical Education
C. E. Knott (1921-1959)	Mechanical Engineering and Dean of Engineering
Alexander N. Landyshev (1956-1972)	Electronic and Electrical Engineering
Richard Leach (1930-1971)	Poultry Industry
Vance D. Lewis (1946-1972)	Physics and Associate Dean, Science and Mathematics
Reynold H. Lonborg (1946-1970)	Crops
Ena L. Marston (1946-1970)	English
M. C. Martinsen (1915-1957)	Aeronautical Engineering
C. O. McCorkle (1932-1960)	Agricultural Economics and Dean of the College
Douglass W. Miller (1953-1968)	Journalism
Glenn A. Noble (1947-1973)	Biological Sciences
Howard R. O'Daniels (1938-1971)	Business Administration
Philip H. Overmeyer (1958-1972)	Business Administration
Oscar E. Reece (1956-1973)	Crop Science
R. Howell Reece (1946-1964)	Mechanical Engineering
Carlos C. Richards (1946-1971)	Engineering Technology
Torleif M. Rickansrud (1944-1969)	Physics
John P. Riebel (1947-1968)	English and Speech
Vard M. Shepard (1932-1960)	Animal Husbandry and Dean of Agriculture
Warren T. Smith (1952-1973)	Dean of Agriculture and Chief of Party, Thailand Project
Ralph E. Weston (1948-1967)	Mathematical Sciences
Francis F. Whiting (1946-1970)	Engineering Technology
C. Paul Winner (1940-1971)	Agricultural Mechanics
Dorothy S. Wright (1946-1966)	Librarian



DISTINGUISHED TEACHER AWARD RECIPIENTS

In 1963 the University instituted a program of recognizing outstanding teaching efforts through the Distinguished Teacher Awards. Selections for this honor are based upon recommendations of the Academic Senate committee which follows the procedure of soliciting nominations from students and colleagues. Evaluations and subsequent recommendations of the nominees are based upon an in-depth review by the committee, including classroom visitations. Recipients of the Distinguished Teacher Awards and their departments since the inception of the program are listed below.

- 1963-64 Robert E. Holmquist, Physics
John L. Merriam, Agricultural Engineering
- 1964-65 Joy O. Richardson, Mechanical Engineering
Milo E. Whitson, Mathematics
- 1965-66 A. Norman Cruikshanks, Social Sciences
Richard F. Johnson, Animal Husbandry
George R. Mach, Mathematics
- 1966-67 Robert W. Adamson, Mechanical Engineering
Kenneth G. Fuller, Mathematics
William D. Curtis, Psychology
- 1967-68 Rodney G. Keif, Environmental Engineering
David M. Grant, English
Wesley S. Ward, Architecture
- 1968-69 Robert M. Johnson, Mechanical Engineering
Bruce Kennelly, Chemistry
Alice E. Roberts, Education
- 1969-70 Donald W. Hensel, History
David H. Montgomery, Biological Sciences
Philip H. Overmeyer, Business Administration
Willard M. Pederson, English
Omer K. Whipple, Chemistry
- 1970-71 Robert L. Cleath, Speech
Kenneth E. Schwartz, Architecture
Hewitt G. Wight, Chemistry
- 1971-72 Stuart E. Larsen, Aeronautical Engineering
Barton C. Olsen, History
Ronald L. Ritschard, Biological Sciences
Joseph N. Weatherby, Social Sciences

STAFF EMERITI

(Dates indicate period of service)

Jack Bertram (1952-1972)	Foundation
Richard T. Crosby (1949-1971)	Business Affairs
Roy E. Darr (1953-1971)	Business Affairs
Paul S. Dillon (1947-1971)	Foundation
Patricia A. Eilers (1957-1972)	Student Affairs
Lena Gianolini (1949-1972)	Business Affairs
Gertrude Gladin (1957-1972)	Student Affairs
Joseph C. Hampl (1943-1971)	Foundation
Raymond T. Hesse (1948-1972)	Business Affairs
Donald S. Nelson (1943-1971)	Director, Business Affairs
Catherine Nolan (1945-1971)	Business Affairs
Alfred J. Pelucca (1956-1971)	Business Affairs
Charles O. Penwell (1946-1971)	Foundation
Frank G. Piper (1937-1972)	Business Affairs
Lucy Schmidt (1956-1972)	Business Affairs
Thornton G. Snider (1954-1973)	Foundation
Frank H. Wyman (1956-1972)	Business Affairs

FACULTY AND STAFF

(Number in parentheses indicates year of appointment)

Listed as of May, 1973

ABITIA, FRED (1969).....Industrial Technology
B.A., San Jose State College, 1964; M.A., 1966; Ed.D., Washington State University, 1971.

Experience: Technician, Engineering Department, San Jose State College; Teacher, Abraham Lincoln High School, San Jose; Instructor, San Jose State College; Assistant Professor, Chico State College; Assistant Professor, Washington State University; draftsman, U.S. Navy.

ADAMS, JOHN P., JR. (1970).....Economics
M.A., Claremont Graduate School, 1968; Ph.D., 1972.

Experience: Military assistance plans officer, JUSMAG—Thailand; advisor to Directorate of Operations, Royal Thai Army; instructor, California State Polytechnic College, Kellogg-Voorhis; staff associate/director, Claremont Manpower Institute, Claremont Graduate School; Lt. Colonel, U.S. Army.

ADAMSON, ROBERT W. (1953).....Mechanical Engineering
B.S., Tulane University, 1941; M.S., Ch.E., Oregon State College, 1948.

Experience: Petroleum refinery engineer, Standard Oil Company of New Jersey; instructor, mechanical engineering, Oregon State College; research assistant, industrial sales engineer, Union Oil Company of California. Registered professional engineer, California.

ALBERTI, ROBERT E. (1969).....Counselor
B.S., California State Polytechnic College, San Luis Obispo, 1959; M.A., California State College, Los Angeles, 1962; Ph.D., Michigan State University, 1969.

Experience: Associate Dean of Students and assistant to the vice president, California State Polytechnic College, Pomona; senior graduate assistant, Michigan State University; program director, Memorial Union, Arizona State University; coordinator of student activities, California State College, Los Angeles; research technician, University of California, Los Angeles.

ALEXANDER, WILLIAM M. (1958).....Head, Political Science Department
B.S., Oregon State University, 1949; M.S., 1951; M.A., Pennsylvania State University, 1953; Ph.D., University of Oregon, 1962; additional graduate study, University of Stockholm, George Washington University, University of Georgia.

Experience: Management assistant, U.S. Geological Survey; teaching fellow, University of Oregon; instructor, Oregon State University; Fulbright professor of political science, India.

AL-HADAD, SABAH (1965).....Mathematics
B.S., Texas Technological College, 1960; M.A., California State Polytechnic College, 1962; Ed.D., Arizona State University, 1972.

Experience: Director, Ministry of Agricultural Development, Baghdad, Iraq.

ALLEN, RAY R. (1955).....Engineering Technology and Environmental Engineering
B.A., Santa Barbara State College, 1942; M.A., California State Polytechnic College, 1965; additional graduate study, University of Southern California.

Experience: Chemist, Ventura Coastal Lemon Co.; technician, U.S. Air Force; instructor, U.S. Naval Air Technical Training Center; engineer, Carpinteria Fire District; consultant, USAID, Africa.

AMANZIO, JOSEPH C. (1971).....Architecture
B. Arch., University of Florida, 1967; graduate study, Washington University.

Experience: Lecturer, University of Strathclyde, Glasgow, Scotland; visiting foreign lecturer, Regional College of Art, Hull, England; teaching assistant, Washington University; designer, Greenleaf and Telesca, Architects and Engineers; designer-draftsman, Watson, Deutschman and Kruse, Architects and Engineers; draftsman, campus architect, University of Florida.

AMARAL, ALFRED W. (1967).....Executive Director, Foundation
B.S., California State Polytechnic College, 1964; M.B.A., Golden Gate College, 1970.

Experience: Assistant manager, G. L. Soares Labor Contractor; assistant sales manager, Martin Produce, Inc.; agricultural representative, Wells Fargo Bank; Instructor, Agricultural Management, Cal Poly, SLO.

AMATO, ANTHONY J. (1955)Ornamental Horticulture
B.S., California State Polytechnic College, 1949; graduate study, California State Polytechnic College.

Experience: Instructor, Mt. San Antonio Junior College, Pomona; Oakland Junior College; landscape architect and contractor, Walnut Creek, California; officer, U.S. Air Force.

ANDERSON, ELIZABETH B. (1958).....English
B.S., Ohio University, 1938; M.A., California State Polytechnic College, 1959; additional graduate study, University of California, Santa Barbara.

Experience: Reporter and feature writer, Athens Messenger, Athens, Ohio; copywriter, Cleveland Press, Cleveland, Ohio; advertising department, General Electric Company, Bridgeport, Connecticut; free-lance writing.

ANDERSON, RICHARD A. (1947).....Men's Physical Education
B.S., University of Southern California, 1942; M.S., 1947; additional graduate study, University of California at Los Angeles.

Experience: Playground director, Los Angeles Playground and Recreation Department; officer, U.S. Navy; swimming pool director, South Pasadena; assistant instructor in physical education and assistant swimming coach, University of Southern California.

ANDERSON, ROY E. (1949).....Business Administration
A.B., Pacific Lutheran College, 1940; M.A., Stanford University, 1948; M.B.A., 1952; Ed.D., 1963.

Experience: Assistant manager, Hancock Oil Company, Tacoma, Washington; teacher, Parkland and Tacoma, Washington, public schools systems; officer, U.S. Army; instructor, Monterey Peninsula College, Monterey, California; National Park ranger; dean, arts and sciences division, California State Polytechnic College.

ANDERSON, RUSSELL K. (1955).....Animal Science
B.S., University of Minnesota, 1948; M.S., Iowa State College, 1950; Ph.D., 1956.

Experience: U.S. Air Force; instructor, Animal Husbandry Department, Iowa State University.

ANDERSON, WARREN R. (1946).....Electronic and Electrical Engineering
B.S., University of Minnesota, 1939; B.S., Louisiana State University, 1944; graduate study, Central Signal Corps School, Camp Crowder, Missouri.

Experience: Teacher of agricultural science, Windom, Minnesota; engineer, Plant Engineering Agency, Philadelphia; engineer, Automatic Electric Company, Chicago. Registered professional engineer, California.

ANDOLI, FREDERICK P. (1968)Biological Sciences
B.A., Upsala College, 1963; M.S., Utah State University, 1968.

Experience: Teaching assistant, Upsala College, Utah State University; research supervisor, Army Chemical Corps.

ANDREINI, ROBERT L. (1954)Speech Communication
B.A., Stanford University, 1941; M.A., 1949; additional graduate study, University of California, Berkeley, Teachers College, Columbia University.

Experience: U.S. Air Force; Royal University of Pisa, Italy; teacher, California high schools.

Faculty and Staff

ANDREOLI, ALFRED E. (1963).....Aeronautical Engineering
B.S., University of Colorado, 1954; M.S., California Institute of Technology, 1956;
additional graduate study, University of Colorado.

Experience: Test engineer, aerodynamicist, Northrop Aircraft; assistant professor, Los Angeles State College; teaching associate, University of Colorado.

ANDRESEN, JAMES G. (1956).....Mechanical Engineering
B.S., California State Polytechnic College, 1956.

Experience: U.S. Army.

ANDREWS, CHARLES T. (1972).....Business Administration
B.S., Eastern Illinois University, 1960; M.B.A., Bowling Green State University, 1963; D.B.A., Indiana University, 1968.

Experience: Associate dean, Creighton University; assistant professor, University of Missouri, Columbia; faculty lecturer, Indiana University; instructor, Elmhurst College; accountant, Marathon Oil Co.; C.P.A.

ANDREWS, DALE W. (1950).....Academic Vice President
B.S., University of California, Davis, 1941; M.A., California State Polytechnic College, 1952; Ph.D., University of Minnesota, 1957.

Experience: Director of agriculture and supervising teacher, Merced Union High School; director of agriculture and supervising teacher, Arroyo Grande Union High School, Arroyo Grande; officer, U.S. Marine Corps; agricultural teacher trainer, instructional materials coordinator, and special educational services coordinator, Dean of the College, Vice President, California State Polytechnic College; senior Danforth associate.

APFELBERG, HERSCHEL L. (1971).....Graphic Communications
B.S., Rochester Institute of Technology, 1965; graduate study, California Polytechnic State University.

Experience: Printing superintendent, Equitable Bag Company; process engineer and rotogravure administrator, American Can Company; compositor and linotype operator, Gannett Company, Inc.

ARCHIBALD, LYNN J. (1972).....Men's Physical Education
B.S., Fresno State University, 1968; M.S., California Polytechnic State University, 1972.

Experience: Assistant basketball coach, Long Beach State University; coach and teacher, Los Amigos High School, Garden Grove, California.

ARMENTROUT, WILLIAM W. (1953).....Coordinator, Secondary Education
B.J., University of Missouri, 1939; A.B., Colorado State College of Education, 1940; M.A., Columbia University, 1940; Ed.D., Stanford University, 1953.

Experience: Guidance counselor, Menlo School and College; personnel classification officer and personnel consultant, U.S. Air Force; associate registrar, Stanford University; test officer, assistant to Dean of Arts and Sciences, California State Polytechnic College.

ASBURY, ROBERT F., JR. (1964).....Architecture
B.S., University of Kansas, 1954; M. Arch., 1961; additional graduate work, University of Hawaii.

Experience: Assistant professor, University of Kansas; designer-draftsman, various architectural firms; U.S. Air Force. Registered architect, Kansas.

ATLEE, CHARLES B., JR. (1969).....Crop Science
B.S., Pennsylvania State University, 1950; M.S., University of California, Davis, 1962.

Experience: Farm adviser, University of California Agricultural Extension Service, Santa Cruz and Monterey Counties; horticulture adviser, U.S. Agency for International Development, Guatemala, Central America.

- ATTALA, EMILE E. (1970)**.....Computer Science & Statistics
B.S., Cairo University, Cairo, Egypt, 1958; M.S., University of California, Berkeley, 1964; additional graduate study, University of California, Santa Barbara.
Experience: Engineer, Shell Oil Company; member technical staff, Autonetics, Astrodata Inc.; evening instructor, Los Angeles Trade Technical College; member technical staff, TRW Systems Group, Redondo Beach, California.
- BABB, JAMES H. (1959)**.....Graphic Communications
Experience: Fifteen years experience in printing, 6½ of which was as owner of Visalia Printing Service; special training and lab experience with U.S. Navy Aerial Torpedo Testing Station, Whidby Island, Washington.
- BABCOCK, RICHARD D. (1973)**.....Business Administration
B.S., Indiana University, 1958; M.S., Arizona State University, 1963; Ph.D., University of California, Los Angeles, 1970.
Experience: Assistant professor, California Polytechnic State University, California State College at Fullerton, University of Illinois, DePaul University.
- BABOS, PARASCHOS (1972)**.....Biological Sciences
B.S., Birmingham University, England, 1960; Ph.D., London University, England, 1962.
Experience: Assistant professor, Edinburgh University, Scotland; head of virus laboratory, Benaki Institute, Athens, Greece; research associate, research assistant professor, assistant professor, Washington University, St. Louis, Missouri.
- BABOW, IRVING P. (1971)**.....Social Sciences
A.B., University of California, Berkeley, 1936; Ph.D., 1954.
Experience: Research director, San Francisco Civil Rights Inventory; research director, San Francisco Community Health and Rehabilitation Study; study director, Alameda County Mental Health Study; study director, California Cancer Patient Study; research sociologist, U.S. Public Health Service; instructor, Golden Gate College; lecturer and acting assistant professor, School of Social Welfare, University of California, Berkeley; research social scientist, California Department of Mental Hygiene.
- BACHMAN, ALFRED M. (1970)**.....Mathematics
B.S., Oregon College of Education, 1952; M.Ed., 1960, M.S., 1964; Ph.D., University of Oregon, 1968.
Experience: Associate professor, California State College, Fullerton; visiting professor, Temple University; assistant professor, Lane Community College; assistant professor, Portland State University; elementary and high school teaching.
- BACON, JAMES P., JR. (1967)**.....Biological Sciences
A.B., Carleton College, 1961; M.S., Michigan State University, 1962; Ph.D., University of Chicago, 1969.
Experience: Research and field assistant, Field Museum of Natural History of Chicago, Michigan State University; teaching assistant, University of Chicago.
- BAGNALL, JAMES R. (1969)**.....Architecture
B.A., Occidental College, 1957; graduate study, University of California, Berkeley.
Experience: Designer, Robertson Montgomery, San Francisco and James Robertson, Sausalito; exhibits designer, The Oakland Museum; private practice, Berkeley, California.
- BAILEY, PHILIP S. (1969)**.....Chemistry
B.S., University of Texas, 1964; Ph.D., Purdue University, 1969.
Experience: Research assistant, University of Texas; instructor and research assistant, Purdue University.
- BAILEY, ROGER S. (1962)**.....Art
B.A., Allegheny College, 1949; M.A., State University of Iowa, 1951.
Experience: Supervising teacher, State University of Iowa; art instructor, Coronado High School and La Mesa Junior High School; art supervisor, Escondido Union School District; instructor in art education, University of California Extension; Palomar Junior College and Pacific Lutheran University, Washington.

Faculty and Staff

- BAKER, EDWARD H. (1968)**.....Mechanical Engineering
B.S., Northwestern University, 1958; M.S., University of California, 1963; Ph.D., Northwestern University, 1965.
Experience: Senior technical specialist, North American Rockwell Corporation.
- BALDWIN, VIRGINIA (1970)**.....Library
B.A., Vassar College, 1927; M.A., School of Library Service, Columbia University, 1932.
Experience: Cataloger, New York Public Library, University of California at Santa Barbara, California State Library.
- BALL, R. WAYNE (1969)**.....Medical Officer
M.D., University of Missouri School of Medicine, 1961.
Experience: Internship, Mercy Hospital, Des Moines, Iowa; residency, Santa Barbara General Hospital, Santa Barbara, California; private practice, Santa Maria, California.
- BALTHASER, LAWRENCE H. (1969)**.....Physics
B.A., Rutgers University, 1960; M.A., Indiana University, 1963; Ph.D., 1969.
Experience: Map draftsman, Sun Oil Company; field assistant, New Jersey Agricultural Experiment Station; teaching assistant, Indiana University; assistant professor, Southampton College.
- BANKS, BERNARD W. (1969)**.....Mathematics
B.A., San Diego State College, 1964; M.S., 1967.
Experience: Pilot officer, Royal Air Force; engineering aid, Aeroflex Corp.; tutor, National Science Foundation; mathematician, Naval Undersea Warfare Center; teaching assistant and lecturer, San Diego State College.
- BARKER, EDWARD H. (1971)**.....Business Administration
B.A., University of California at Los Angeles, 1937; M.S., University of Southern California, 1945; Ph.D., 1963.
Experience: Instructor, Los Angeles Manual Arts High School, United States Army Air Force, and Columbia Broadcasting System; professor, University of Southern California; salesman and bookkeeper, Sydney E. Walsh Agency, Los Angeles; production control, Vultee Aircraft, Downey, California; executive, Barker Bros. Corporation, Los Angeles; sales manager, Market Research Associates, Pasadena.
- BARNES, TIMOTHY M. (1969)**.....History
B.A., University of New Mexico, 1965; M.A., 1966; Ph.D., 1970.
Experience: Instructor, University of Albuquerque; graduate assistant, University of New Mexico.
- BARR, STANLEY L. (1959)**.....English
B.A., St. Bernardine of Siena College, 1953; M.A., University of Michigan, 1955; additional graduate study, University of Wisconsin, Harvard University, University of Oregon.
Experience: Teacher, Michigan Public Schools; assistant professor, Lakeland College; instructor, Wisconsin State College.
- BARROWS, FRANK B. (1968)**.....Industrial Technology
B.S., U.S. Merchant Marine Academy, 1949; Ed.D., Utah State University, 1970.
Experience: Research and teaching assistant, Utah State University; assistant professor, University of Southern California; instructor, College of San Mateo; teacher, Westmoor High School; engineer, various merchant vessels; officer, U.S. Navy.
- BARROWS, ROBERT S. (1970)**.....Counselor
B.S., University of New Hampshire, 1959; M.Ed., State University of New York at Buffalo, 1965; Ed.D., State University of New York at Albany, 1970.
Experience: Counselor, Urban Center, State University of New York; visiting professor, State University College, Oneonta, New York; teaching assistant, State University of New York at Albany; counselor, secondary schools, Wappingers Falls, New York; teacher of agriculture, Poland, New York; U. S. Navy.

- BATTERSON, RONALD E. (1971)**.....Architecture
 B.S., Arch., University of Cincinnati, 1964; M. Arch., University of Washington, 1970.
 Experience: Teaching assistant, University of Washington; designer for Reed Morgan, AIA, Seattle, Larry Blackman, AIA, Indiana, Sanborn, Steketee, Otis & Evans, AIA, Toledo, Ohio, Ole Helweg, MAA, Denmark, Carl Strauss, AIA, Cincinnati, Ohio; planner and coordinator, Inter-American Center, Miami, Florida.
- BAUMGARTEN, GEORGE M. (1969)**.....Architecture
 B. Arch., University of Michigan, 1947; graduate study, New York Structural Institute and New School of Social Research.
 Experience: Lecturer, Old Dominion University; private practice; project architect, John Graham & Co.; project coordinator, Victor Gruen Association; zoning analyst, Harrison, Ballard and Allen; designer, Skidmore, Owings and Merrill; Registered architect, New York, Michigan.
- BAUR, LAWRENCE E., JR. (1965)**.....Business Administration
 B.B.A., University of Michigan, 1954; M.B.A., 1957
 Experience: Staff accountant, Wagar, Lunt and Oehring, Michigan; accountant, U.S. General Accounting Office, Los Angeles; staff accountant, Touche, Ross, Bailey and Smart, Los Angeles; staff accountant and partner, Charles Belcher and Company, San Luis Obispo; U.S. Army; C.P.A.
- BEATIE, GEORGE C. (1959)**.....Music
 A.B., University of California at Santa Barbara, 1949; M.A., California State Polytechnic College, 1956; additional graduate study, University of California at Santa Barbara, Northwestern University.
 Experience: Assistant instructor, University of California at Santa Barbara; music director, USNR, University of Rochester, New York; teacher, Nipomo Elementary School, Oceano Elementary School, Arroyo Grande Union High School; director, student activities, Arroyo Grande Union School; band director, class program scheduler, California State Polytechnic College, San Luis Obispo.
- BEAUCHAMP, ROBERT O. (1970)**.....Architecture
 B.A., University of California, Berkeley, 1957.
 Experience: Private practice, Santa Monica; housing construction consultant, Victor Gruen Assoc., construction supervisor, Frank O. Gehry & Assoc.; draftsman, job captain for various architectural firms. Registered architect, California.
- BEAUVAIS, H. PAUL (1970)**.....Senior Clinical Laboratory Technologist
 Hospital Corps School, Medical Dept., U.S. Navy, 1942; Glendale College, 1949-51.
 Experience: Chief laboratory technologist, Northridge Hospital, Northridge, California; Facey Medical Group, Granada Hills, California.
- BEECHER, LLOYD N. (1969)**.....History
 B.A., California State College, Fullerton, 1965; M.A., 1966, Ph.D., University of Georgia, 1970.
 Experience: graduate assistant, California State College, Fullerton; teaching assistant, University of Georgia.
- BEGG, IAN C. (1970)**.....Engineering Technology
 B.S.M.E., Witwatersrand University, Johannesburg, South Africa, 1941; B.S.E.E., 1946; M.S., University of California, Berkeley, 1970.
 Experience: Senior project engineer, The Rucker Co., Oakland; plant and tool engineer, Gilro Machine & Stamping Co., Oakland; tool designer, Kearney & Trecker Corp., Milwaukee, Wisconsin; production engineer, First Electric Corp., Knights, Transvaal South Africa; test engineer, Electricity Supply Commission, Rosherville, Johannesburg; college apprentice, Metropolitan-Vickers Electrical Co., Trafford Park, Manchester, England; chief petty officer, South African and Royal Navies; Corporal, South African Engineering Corps. Registered professional engineer, California and South Africa.

Faculty and Staff

- BEHMAM, SARA A. (1971)**.....Economics
 A.B., University of Pennsylvania, 1943; M.G.A., 1944; Ph.D., University of California, Berkeley, 1966.
 Experience: Labor market analyst, California Department of Employment; research technician, California Senate Interim Committee on State and Local Taxation; historical assistant, Chicago Quartermaster Depot; research assistant, Department of Internal Affairs, Commonwealth of Pennsylvania; director of research, Center for Labor Research and Education at the Institute of Industrial Relations, University of California, Berkeley; lecturer, University of California, Berkeley; assistant professor, San Jose State College.
- BENNETT, DARRELL F. (1971)**.....Pharmacist
 B.S., University of Arizona, 1965.
 Experience: Registered pharmacist in retail pharmacies; Registered pharmacist, San Luis Obispo County Hospital.
- BERGHELL, JOY GARRISON (1956)**.....Library
 B. of Journalism, University of Missouri, 1935.
 Experience: Copywriter, public relations and promotion, Los Angeles Times; account executive, R. W. Webster Advertising, Los Angeles; editorial writer, Southwestern Signal Corps Training Center, San Luis Obispo; free-lance advertising, publicity and newspaper writer.
- BERGLUND, HOWARD SCOTT (1973)**.....Architecture
 B.Arch., University of Washington, 1963; M.Arch., University of California, Berkeley, 1971.
 Experience: Project designer, Alfred Wasthuber, Architect, San Francisco; project architect, Naramore, Bain, Brady & Johanson, Seattle, Washington; designer job captain, Gerald Weisbach, College of Architecture, University of Southern California, Los Angeles.
- BERGTHOLD, FREDERICK M., JR. (1969)**.....Engineering Technology
 B.S., California State Polytechnic College, 1958; M.S.E.E., University of Southern California, 1968.
 Experience: U.S. Air Force; Central Office Equipment Installer, Western Electric Corporation; radio technician, California Air National Guard; instrument research engineer, NASA, Ames Research Center; electronic engineer, Interstate Electronics; engineering specialist, Philco-Ford Corporation. Registered professional engineer, California.
- BERMANN, JAMES (1964)**.....Agricultural Engineering
 B.S., California State Polytechnic College, 1959, 1961; M.S., Michigan State University, 1971.
 Experience: Chief engineer, Grether Agricultural Co.; Farming; U.S. Army.
- BETHEL, ARTHUR C. W. (1968)**.....Philosophy
 B.A., University of California, Santa Barbara, 1964; M.A., 1968.
 Experience: Associate instructor, University of California, Santa Barbara.
- BETZ, ELLARD W. (1947)**.....Engineering Technology
 B.A., Santa Barbara State College, 1942.
 Experience: U.S. Navy; teacher, Victorville, California.
- BEYMER, CHARLES R. (1966)**.....Library
 B.S., University of Wisconsin, 1950; M.L.S., 1955; additional graduate study, University of Wisconsin, University of California, Berkeley.
 Experience: Cataloger, Marquette University, Cornell University, Finger Lakes Library System, Ithaca, New York; science reference librarian, University of Notre Dame.
- BICKLEY, CORINE A. (1972)**.....Computer Science and Statistics
 B.S., Iowa State University, 1970; graduate study, Washington State University.
 Experience: Technical writer, IBM; research assistant, Washington State University.

- BILLINGSLEY, JOHANNA** (1969) Library
B.A., Saint Mary's College, 1966; M.L.S., State University of New York at Geneseo, 1967.
Experience: Reference Librarian, University of Montana.
- BIRKETT, RICHARD J.** (1955) Animal Science
B.S., California State Polytechnic College, 1953; M.S., Kansas State University, 1963.
Experience: Feed and milling supervision, Union Stock Farms, Blythe, California; research assistant, Kansas State University.
- BLACK, WILLIAM C., COL.** (1972) Head, Military Science Department
A.B., University of California, Los Angeles, 1950; M.B.A., Syracuse University, 1958; U.S. Army Command and General Staff College, 1962; Armed Forces Staff College, 1965.
Experience: Command and staff assignments in European and Pacific theaters; comptroller, USA Garrison, Boston Army Base, Department of Army Staff; deputy comptroller, USA Tank Automotive Command, Warren; chief, Plans Division, PP&D Dir, CORDS, Military Assistance Command, Vietnam.
- BLOOM, EMMETT A.** (1946) Animal Science
B.S., University of California, Davis, 1934.
Experience: Agricultural instructor at Ripon, Laton, and Corning High Schools.
- BOCHE, RAYMOND E.** (1969) Director, Computer Center
B.S., California State Polytechnic College, SLO, 1958; M.S., San Jose State College, 1966; Ph.D., Texas Technological College, 1971.
Experience: Computing, mathematics and operations research, The Boeing Company, Seattle; Technical Operations, Inc., Monterey and Washington, D.C.; Laboratory for Electronics, Monterey; Lockheed Missiles and Space Co., Palo Alto and Sunnyvale; assistant director of the Computer Center and assistant professor of Industrial Engineering and Computer Science, Texas Technological College.
- BODLAK, DAVID B.** (1969) Art
B.A., University of California, Santa Barbara, 1960; M.F.A., Claremont Graduate School, 1966.
Experience: Assistant Dean, and instructor in painting and drawing, Chouinard Art School; director of admissions, California Institute of the Arts; faculty, Ohio University College of Fine Arts; gallery assistant, Scripps College; teaching assistant, Claremont Graduate School.
- BOHLE, JAMES P.** (1971) Computer Science and Statistics
B.S., University of Oregon, 1969; M.S., 1971.
Experience: Service/parts department dispatcher, Litton Dental Supply; tutor, programmer consultant, teaching assistant, University of Oregon.
- BONDS, ROBERT V.** (1972) Coordinator, Student Community Services
B.A., San Jose State University, 1965; M.S., University of California, Los Angeles, 1972.
Experience: Teacher-counselor, Rancho Linda School, San Jose; teacher-adviser-coach, North High School, Riverside; consultant for ethnic involvement in education, Santa Clara County, Riverside County, San Bernardino County, Los Angeles County; assistant aquatic director, University of California, Los Angeles; assistant dean of students, University of California, Los Angeles.
- BONGIO, ENRICO P.** (1948) Engineering Technology
A.B., Chico State College, 1948; M.A., California State Polytechnic College, 1965.
Experience: Welder, Chicago Bridge and Iron Co. and Eureka Boiler Works and Steel Products, Eureka, California; U.S. Army Signal Corps; instructor, Sonoma Valley Union High School, Sonoma, California; metals inspector and welding instructor, Hunters Point Naval Shipyard; nondestructive testing technician, Ferro-Spec Laboratory, Los Angeles; instructor, welding operator qualification tests, Bethlehem Steel Co., Pinole, California.

Faculty and Staff

- BOONE, JOSEPH C. (1968)** Physics
B.A., Earlham College, 1962; M.A., University of Wisconsin, 1967; Ph.D., 1970.
Experience: Teaching and research assistant, University of Wisconsin.
- BOOTH, JAMES S. (1972)** Biological Sciences
B.S., Los Angeles State College, 1959; M.S., University of Southern California, 1962; Ph.D., 1968.
Experience: Research assistant, instructor, University of Southern California; instructor, California State College, Los Angeles; assistant professor, University of New Mexico.
- BOROUGHES, HOWARD (1970)** Associate Dean, Graduate Studies and Research
B.A., University of Southern California, 1949; Ph.D., California Institute of Technology, 1953.
Experience: Research Fellow, UCLA, University of Paris; Associate Professor, University of Hawaii; Professor and Head of Nuclear Energy Program, Inter-American Institute of Agricultural Sciences (OAS); Program Director and Staff Associate, National Science Foundation; Assistant Division Director, Bureau of Higher Education, Office of Education; Dean of Faculties, Portland State University.
- BOSTROM, ROBERT M. (1956)** Director, Housing
B.S., California State Polytechnic College, 1956; M.A., 1970.
Experience: Graduate manager, California State Polytechnic College.
- BOUIE, ANN S. (1972)** Education
B.A., University of California, Riverside, 1971; M.A., Stanford University, 1972.
Experience: Counselor, Riverside Unified School District; counselor, Tutorial-Counseling Center, Riverside City College; counselor-aide, Central Junior High School, San Mateo Unified School District, Burlingham High School; tutor, community-aide, Nairobi College.
- BOWEN, JAMES J. (1972)** Education
B.A., Western Michigan University, 1962; M.A., 1965; Ed.D., University of California, Los Angeles, 1969.
Experience: Elementary school teacher, Inlay City, Michigan and Lompoc, California; assistant professor, California State University, Los Angeles.
- BOYCE, WILLIAM M. (1966)** Business Administration
B.S., University of Connecticut, 1938; graduate work at George Washington University, California State Polytechnic College; graduate Command and General Staff College, 1945; Special Weapons Officer Course, 1955.
Experience: Infantry platoon leader, battalion commander and deputy battle group commander; instructor and committee chairman, U.S. Army Infantry School, Ft. Benning, Georgia; inspector general; member of Department of the Army general staff and the joint staff of the Joint Chiefs of Staff, Washington, D.C.; head, Military Science Department, Director of Developmental Affairs, California State Polytechnic College; national senior vice president, Campus Division, Society for Advancement of Management.
- BRADY, MARY L. (1968)** Library
B.A., Mundelein College, 1960; M.A.L.S., Rosary College, 1966.
Experience: Editorial assistant, The National Catholic Monthly, Chicago; cataloger, Mundelein College.
- BREAZEALE, CONNIE R. (1966)** Home Economics
B.S., California State Polytechnic College, 1960; M.S., 1966.
Experience: Chairman, Home Economics Department, Santa Maria High School.
- BRENNAN, ANDREW (1968)** Men's Physical Education
B.S., University of Southern California, 1958; M.S., 1960.
Experience: Graduate assistant, University of Southern California; teacher/coach, Mira Loma High School, Glendale High School, Downey High School, Rio Hondo Junior College.

- BRENNER, PATRICIA A. (1970)**.....English
B.S., Bob Jones University, 1957; M.A., Middlebury College, 1963; Ph.D., Kent State University, 1970.
Experience: Teacher, Binghampton, N.Y., Winchester, Massachusetts, Beachwood, Ohio, Kent State University, Ohio.
- BRIDGES, LARRY M. (1970)**.....Men's Physical Education
B.S., Indiana State University, 1963; M.S., 1964; second M.S., 1969.
Experience: Graduate assistant/teaching fellow, Indiana State University; instructor, Public School, Marian College, Indianapolis, and Wayne State University.
- BRODIE, DAVID A. (1970)**.....Architecture
B. Arch., University of Capetown, S. Africa, 1953; M. Arch., University of California, Berkeley, 1964.
Experience: Assistant planner, City of Oakland; professor, and teaching assistant, University of California, Berkeley; architect for various firms in England and Rhodesia.
- BROWN, HOWARD C. (1946)**.....Head, Ornamental Horticulture Department
B.S., California State Polytechnic College, 1943; M.S., Ohio State University, 1954; Ph.D., 1963.
Experience: U.S. Army Air Force.
- BROWN, MARVIN D. (1956-63) (1964)**.....English
A.B., Washburn College; B.D., Andover Newton Theological School, 1936; S.T.M., 1939; Th.D., Iliff School of Theology, Denver, 1954; additional graduate study, University of Denver.
Experience: Pastor, Garden City, Kansas and Santa Barbara and San Luis Obispo, California; instructor, California State Polytechnic College; chaplain, U.S. Army.
- BROWN, ROBERT J. (1969)**.....Biological Sciences
B.S., California State College, Los Angeles, 1964; M.S., Arizona State University, 1967; Ph.D., University of Toronto, Ontario, Canada, 1972.
Experience: Teaching assistant, California State College, Los Angeles; research assistant, Arizona State University; teaching assistant, University of Toronto.
- BROWN, WILLIAM H. (1957)**.....Director, School of Architecture and Environmental Design
B. Arch., University of Florida, 1954; M. Arch., 1968; additional graduate study, University of Sydney.
Experience: Draftsman, Trend Associates, L. C. Kingscott and Associates, Viking Products Company, Valley Metal Products Company; instructor, University of Florida; architectural designer, John E. Piercy, D. Stewart Kerr; private practice. Registered architect, California.
- BRUCKART, WILLIAM L. (1969)**.....Industrial Technology
B.S., University of Kentucky, 1942; M.S., Ohio State University, 1953; additional graduate study, Bowdoin College and Massachusetts Institute of Technology.
Experience: Officer, U.S. Navy; engineer, Southern Liquid Gas Co., Dothan, Alabama; assistant chief, non-ferrous physical metallurgy group, Battelle Memorial Institute, Columbus, Ohio; sales manager, Cyclops Corporation, Bridgeville, Pennsylvania; consultant, Pittsburgh, Pennsylvania; manager, metallics and refractories, Aerojet-General Corporation; consultant, Torrance, California; chief engineer, Fansteel, Inc., Advanced Structures Division.
- BRUNK, ATHOL J. D. (1957)**.....Physics
B.S., Northwestern State Teachers College, 1937; M.A., West Texas State Teachers College, 1941.
Experience: Instructor in mathematics and science, high school, Beaver, Oklahoma; elementary principal, Alamogordo, New Mexico; officer, U.S. Navy; mathematics instructor, Atascadero, California.

Faculty and Staff

BUCCOLA, VICTOR A. (1962).....Men's Physical Education
B.S., California State Polytechnic College, 1956; M.A., 1957; Ed.D., Arizona State University, 1972.

Experience: Officer, U.S. Army; physical education instructor and athletic coach, The College of Idaho; science and math instructor and athletic coach, Mark Keppel High School.

BUCICH, RICHARD A. (1963).....Electronic and Electrical Engineering
B.S.E.E., Illinois Institute of Technology, 1954; M.S.E.E., 1956.

Experience: Sub-station operator, electrical engineer, U.S. Steel Corporation; graduate assistant, Illinois Institute of Technology; assistant professor, Purdue University Center.

BUCY, L. LAVERNE (1955).....Animal Science
B.S., University of Kentucky, 1943; M.S., 1950; Ph.D., University of Illinois, 1954.

Experience: Graduate assistant in animal science, University of Illinois; teacher of vocational agriculture, Kentucky high schools; farming; educational adviser, Cal Poly-A.I.D., Swaziland Project; U.S. Navy.

BUFFA, ANTHONY J. (1970).....Physics
B.S., Rensselaer Polytechnic Institute, 1964; M.S., University of Illinois, 1966; Ph.D., 1969.

Experience: Teaching aide, Rensselaer Polytechnic Institute; teaching assistant, research assistant, University of Illinois; lecturer, California State Polytechnic College, San Luis Obispo.

BURROUGHS, SARAH E. (1967).....Home Economics
B.S. and Certificate in Medical Technology, University of Michigan, 1956; Ph.D., University of California, 1967.

Experience: Senior technician, University Hospital, Ann Arbor; biochemist, Akron General Hospital, Ohio; supervising chemist, Parma Community Hospital, Ohio; biochemist, Stanford Research Institute; research/teaching assistant, University of California, Berkeley.

BURT, WALLACE H. (1968).....Business Administration
B.S., University of California, 1949; M.B.A., University of Denver, 1962.

Experience: Teacher, Shasta Union High School; assistant county superintendent of schools, Shasta County; certified public accountant, staff, Muncy and Company; C.P.A.'s instructor, Coalinga College; consultant, State of California; C.P.A.

BURTIS, GRACE J. (1973).....Home Economics
B.S., University of Texas, 1946; M.A., Texas Woman's University, 1953; additional graduate study, Texas Woman's University.

Experience: Home service representative, Texas; teacher, Deady Junior High School, Texas; home service director, Houston Natural Gas Corporation; dietician, Lake Bridgeport Methodist Camp; teacher, Thomas Edison Junior High School, Texas.

BURTON, ROBERT E. (1968).....History
A.B., San Diego State College, 1962; M.A., University of Oregon, 1964; Ph.D., 1969.

Experience: Teaching assistant, University of Oregon; instructor, Glendale College.

BUSCHMAN, WILLIAM O. (1956).....Computer Science & Statistics
A.B., Reed College, 1941; M.Ed., University of Oregon, 1947; Ed.D., Oregon State University, 1953.

Experience: Marine engineering and naval architecture, Kaiser Co., and others; teaching, Portland Public Schools, Gresham Union High School; instructor, Multnomah College, Oregon State University; assistant professor, Oregon State System of Higher Education, General Extension Division; assistant professor, Portland State College; research, University of Oregon Medical School, Stanford Research Institute, and Institute for Motivational Research.

- BUTLER, ROBERT O. (1964)** Computer Science and Statistics
A.B., Fresno State College, 1951; M.A., California State Polytechnic College, 1967; additional graduate study, University of California, Los Angeles State College.
Experience: Teacher, Reedley, Dinuba, Orosi, Paso Robles; vice principal and principal, Paso Robles Union.
- CAHILL, WILLIAM M. (1972)** Medical Officer
A.B., University of Southern California, 1932; Ph.D., University of Berlin, 1936; M.D., Wayne State University, 1948.
Experience: Instructor, Cornell University Medical College; assistant professor, Wayne State University Medical School; general and industrial medical practice, Los Angeles and Alhambra.
- CAIRNS, EDWARD A. (1969)** English
B.A., Stanford University, 1956; M.A., San Francisco State College, 1963; Ph.D., University of Denver, 1971.
Experience: Instructor, University of Denver; assistant professor, Yankton College; instructor and supervisor of instructors, Cryptographic School, USAF.
- CALL, TRACEY G. (1962)** Biological Sciences
B.S., Idaho State College, 1940; M.S., University of Maryland, 1944; A.B., Brigham Young University, 1947; Ph.D., University of Minnesota, 1956.
Experience: Teaching Assistant, Idaho State College; Teaching Assistant, University of Washington; Teaching Assistant, University of Maryland; Drug Store Manager, Afton, Wyoming; Assistant Professor, Duquesne University; Assistant Professor, University of Wyoming; Associate Professor, Montana State University; Research Pharmacologist, Sunkist Growers, Inc.; Project Director-Consultant, W.L.R.I., Holland-Rantos Youngs Rubber Corporation.
- CAMACHO, CHRISTINA (1972)** Counselor
B.A., The University of Texas at El Paso, 1969; M.S., California State University, Los Angeles, 1971.
Experience: Graduate assistant to the Dean of Students, The University of Texas at El Paso; assistant dean of students, University of the Americas, Puebla, Mexico.
- CAMPBELL, MILDRED P. (1972)** Graduate Nurse
A.D.N., Cuesta College, 1971.
Experience: General duty and ICU-CCU, San Luis General Hospital; general duty, Paso Robles War Memorial Hospital.
- CAPURSO, ALEXANDER (1969)** Head, Music Department
B.S., University of Kentucky, 1933; M.A., 1934; Ph.D., 1938.
Experience: Professor, head and executive director of Music Department, University of Kentucky; assistant director, Carnegie Community Study Project; director and professor, School of Music, Syracuse University; associate chairman and professor, Division of Creative Arts, San Francisco State College; research associate, Office of the Chancellor, California State Colleges; president, professor of Humanities and Fine Arts, Stanislaus State College.
- CARNEGIE, E. J. (1963-64) (1965)** Agricultural Engineering
B.S., California State Polytechnic College, 1962; M.Engr., University of California, Davis, 1963.
Experience: Research assistant, University of California, Davis; junior agricultural engineer, University of California; officer, U.S. Naval Reserve.
- CARPENTER, THOMAS W. (1968)** Associate Dean,
School of Engineering and Technology
B.S., Virginia Polytechnic Institute, 1961; M.S., 1964; Ph.D., Purdue University, 1969.
Experience: Research assistant, instructor, Purdue University; engineer, Hamilton Standard.

Faculty and Staff

- CARR, LAURENCE H. (1963)** Mechanical Engineering
 B.S., University of Chicago, 1932; M.S., 1934.
 Experience: Director of research and engineering, Edward Valves, Inc.; lecturer and assistant professor, Purdue University; mechanical engineer, Pacific Gas & Electric Co. Registered professional engineer, California.
- CARR, MALCOLM J. (1970)** Social Sciences
 B.A., University of Missouri, 1940; M.A., Indiana University, 1948; Ph.D., University of California, Los Angeles, 1970.
 Experience: Economic analyst, War Labor Board, and War Assets Administration, Kansas City, Mo.; associate professor, Westminster College, New Wilmington, Pa. and Sam Houston State College, Huntsville, Texas; lecturer, Sacramento State College; assistant professor, San Diego State College; position classifier and management analyst, Sacramento Signal Depot, Hq. 8th Army, Tokyo, and Tachikawa Air Base, Japan; personnel research specialist, Naval Personnel Training and Research Laboratory, San Diego.
- CASS, MARJORIE (1957)** Education
 B.S., University of Nebraska, 1932; M.A., Columbia University, 1945; additional graduate study, University of Missouri, 1947.
 Experience: Teacher, Nebraska and Iowa; instructor, Stephens College; assistant professor, Grinnell College.
- CHANDLER, EVERETT M. (1951)** Dean of Students
 A.B., University of California, 1939; Ph.D., Michigan State University, 1970.
 Experience: Administrative officer, U.S. Air Force; personnel technician, State Personnel Board; management analyst, State Department of Finance; extension teacher, Sacramento State College; U.S. Air Force.
- CHASE, DANIEL C. (1954)** Agricultural Management
 B.S., University of Arizona, 1946; M.Agr. Ed., 1951; Ed.D., Pennsylvania State University, 1954.
 Experience: Teacher of vocational agriculture, veterans' instructor, Tolleson Union High School, Tolleson, Arizona; supervising teacher, University of Arizona; veterans' co-ordinating teacher, State Department of Vocational Education, Phoenix, Arizona; farm editor and columnist, *Arizona Republic*; assistant professor and head, division of farm management, Arizona State College, Tempe, Arizona.
- CHESTNUT, F. STUART (1963)** Men's Physical Education
 B.S., Indiana University, 1951; M.S., 1963.
 Experience: Technical supervisor of industrial athletics, Commercial Solvents Co.; coach-teacher, senior high school, Terre Haute, Indiana, senior high school, Washington, Indiana, senior high school, Brazil, Indiana.
- CHIPPING, DAVID H. (1971)** Physics
 B.S., Cambridge University, England, 1965; M.S., Stanford University, 1967; Ph.D., 1970.
 Experience: Chief field assistant Geological Survey of Canada; teaching assistant, lecturer, Stanford University; assistant professor, University of California, Davis.
- CHIZEK, GAYLORD J. (1958)** Agricultural Management
 B.S., Kansas State College, 1957; M.S., 1958.
 Experience: Assistant instructor, Kansas State College, Manhattan, Kansas; farmer; U.S. Army.
- CHOU, THOMAS T. L. (1961)** Electronic and Electrical Engineering
 B.S.E.E., Chinese National Chekiang University, 1947; M.S.E.E., University of Washington, 1956; additional graduate study, University of California at Los Angeles.
 Experience: Research fellow, NASA Ames Research Center, Moffett Field; senior research engineer, member technical staff, Autonetics, Division of North American Rockwell Corporation, Anaheim, California; associate professor, National Chiao-tung University, Taiwan; senior engineer, Sverdrup-Parcel, Inc., San Francisco; research assistant, University of Washington.

- CHOW, TSUN S. (1971) Computer Science and Statistics
B.S., University of California, Los Angeles, 1968; M.S., 1969; Ph.D., University of California, Berkeley, 1972.
Experience: Research assistant, University of California, Los Angeles and Berkeley.
- CHRISTENSON, ROBERT A. (1970) Child Development
B.S., University of Utah, 1963; M.S., Brigham Young University, 1968; Ph.D., 1970.
Experience: Teaching assistant, part-time instructor, Brigham Young University.
- CICHOWSKI, ROBERT S. (1971) Chemistry
B.S., Purdue University, 1964; Ph.D., Alfred University, 1968.
Experience: Research chemist, Phillips Petroleum Company.
- CIRONE, JOAN M. (1971) Graduate Nurse
R.N., Cuesta College, 1971.
- CIROVIC, MICHAEL M. (1968) Electronic and Electrical Engineering
B.E., New York University, 1965; M.S., 1968.
Experience: Assistant professor, Academy of Aeronautics; engineer, General Cable Corporation.
- CLEATH, ROBERT L. (1968) Speech Communication
B.A., Northwestern College, 1950; M.A., University of Oregon, 1951; Ph.D., University of Washington, 1963; M.Div., San Francisco Theological Seminary, 1965.
Experience: Assistant professor, Westmount College, Whitworth College, University of California; teaching assistant, University of Washington; instructor, California State Polytechnic College; assistant editor, *Christianity Today*, Washington, D.C.
- CLEMENTS, WILLIAM E. (1966) Physics
B.S., Texas A. and I. University, 1965; M.A., 1966.
Experience: Laboratory assistant, research assistant, assistant instructor, Texas Arts and Industries University; teaching specialist in mathematics, Presbyterian Pan American School.
- CLERKIN, EDWARD J. (1964) Electronic and Electrical Engineering
B.S.E.E., Colorado State University, 1950; M.S.E.E., University of Idaho, 1962; additional graduate study, Utah State University, Colorado State University, Oklahoma University.
Experience: Instructor, University of Idaho and Chico State College; graduate assistant, Oklahoma University; technical associate, Argonne National Laboratory; engineer, Diversified Builders, General Electric Company, Rohr Aircraft Corp. Registered professional engineer, California.
- CLOGSTON, FRED L. (1960) Biological Sciences
B.A., B.S., Western Washington College, 1950; M.S., University of Washington, 1956; Ph.D., 1965.
Experience: Instructor, public schools; teaching and research assistant, University of Washington; research associate, Office of Naval Research; instructor, Western Washington College; associate, University of California at Santa Barbara.
- CLOONAN, CLIFFORD B. (1957) Electronic and Electrical Engineering
B.S., University of Colorado, 1955; M.S.E.E., Montana State University, 1961; additional graduate study, Utah State University, University of Colorado.
Experience: Instructor, U.S. Army Signal Corps; physical science aide and electronic scientist, National Bureau of Standards, Boulder, Colorado; systems design engineer, Collins Radio Company, Cedar Rapids, Iowa; research associate and research assistant, Electronic Research Laboratory, Montana State University; consultant, McDonnell Aircraft Company, St. Louis, Missouri; microwave engineer, Hewlett-Packard Company, Palo Alto, National Science Foundation faculty fellow, University of Colorado.

Faculty and Staff

CLUCAS, GEORGE G. (1956-62) (1968) Political Science
A.B., University of Michigan, 1947; M.P.A., 1949; Ph.D., University of Southern California, 1969.

Experience: Senior budget analyst, Office of Legislative Analyst, Sacramento; dean, Finance and Development, California State Polytechnic College; chief, Budget Planning and Operations, Chancellor's Office, The California State Colleges, Los Angeles; director, Research and Development and Interim Dean, School of Business and Social Sciences, California State Polytechnic College.

COATS, DONALD M. (1964) Associate Dean, Educational Services
B.S., California State Polytechnic College, 1964; M.A., 1969.

Experience: Branch manager, Southern Pacific Milling Co., San Luis Obispo; sales representative and materials engineer, Walter B. Roselip Co., Atascadero; quality control inspector, Lindero Investment Co., San Luis Obispo; U. S. Navy; Admissions Officer, California State Polytechnic College.

COBB, ALAN W. (1964) Chemistry
B.S., Oregon State University, 1932; M.S., 1934; Ph.D., University of Wisconsin, 1936; additional graduate study, University of Houston.

Experience: Chemist, Pan American Refinery, American Liberty Oil Company; self-owned drug stores, Texas City; teacher, Alvin College, Monterey Peninsula College; New Mexico Institute of Mining and Technology.

COCHRANE, MONA (1970) Graduate Nurse
R.N., Knapp College of Nursing, Santa Barbara, California, 1953.

Experience: Clinic nursing, Orthopedic and Internal Medicine Specialty, San Luis Medical Clinic; ENT specialty nurse, Phoenix, Arizona; office assistant general surgery, Santa Barbara, California; industrial nursing, Miami Inspiration Copper Co., Miami, Arizona; general staff nurse, San Luis Obispo General Hospital, San Luis Obispo, California.

COCKRIEL, GEORGE W. (1957) Chief Security Officer

Experience: Chief, Pacific Fire District, Sacramento; special agent, U.S. Army counterintelligence; investigator, office of the District Attorney, Reno, Nevada; instructor, fire safety and control, California Highway Patrol Academy, Sacramento.

COLEMAN, EUGENE F. (1972) Graphic Communications
B.S., University of Pittsburgh, 1934; graduate study, University of Pittsburgh, Washington University.

Experience: Physicist, National Bureau of Standards; technical staff member, RCA Laboratories; chief engineer, Hillyer Instrument Corp.; associate research staff, Engineering Experiment Station, Rutgers University; market research manager, Mergenthaler Linotype Co.; lecturer, industrial management, Polytechnic Institute of Brooklyn; research staff member, MGD Graphic Systems.

COLLINS, RALPH C. (1955) Education
B.S., Drake University, 1932; M.A., 1941; Ed.D., University of Colorado, 1951.

Experience: Officer and navigation instructor, U.S. Navy; physics instructor, East High School, Des Moines, Iowa; graduate assistant, Iowa State College and University of Colorado; head, Science Department, Eugene High School, Eugene, Oregon; assistant professor, Central Washington College of Education, Drake University, University of Oregon.

COLOMÉ, JAIME S. (1972) Biological Sciences
B.A., University of California, Santa Barbara, 1966.

Experience: Teaching and research assistant, pre-doctoral fellow, University of California, Santa Barbara.

- COMPTON, LUVENIA (1969)** Library
 A.B., University of Kentucky, 1962; M.S.L.S., 1965; additional graduate study, Allan Hancock College, Temple Buell College.
 Experience: Teacher, Floyd County Board of Education; claims adjuster, Social Security Administration; interviewer and office manager, U.S. Employment Service; teacher, Summit Elementary School; librarian, Norwalk High School and Lompoc Unified School District; district librarian, Rim-of-the-World Unified School District.
- CONE, PAUL R. (1971)** Business Administration
 B.S., Bryant College, 1936; M.S., 1939; B.A., Otterbein College, 1949; M.B.A., Ohio State University, 1950; Ph.D., University of California at Los Angeles, 1964.
 Experience: Director of Graduate Business Studies, Southern Illinois University; associate dean, Graduate School of Business Administration, University of Southern California; financial consultant, Haile Sellassie I University; head of Business Administration, Otterbein College; assistant business manager, Andrews University; senior partner, C.P.A. and management consultant firms, Los Angeles and Columbus, Ohio; president and board chairman, Aerospace Company, Los Angeles; senior vice president, Federal Home Loan Bank, Boston, Mass.; vice president of finance, furniture manufacturer, Los Angeles and Fort Worth; executive vice president, printing companies, Columbus, Ohio and Colon, Panama; hospital administrator, Columbus, Ohio and Boston, Mass.; C.P.A.
- CONNELY, JOHN B. (1970)** Education
 B.A., University of Southern California, 1958; Ph.D., 1970.
 Experience: Foreign Service Officer, vice-consul, U.S. Department of State, Munich, Germany; lecturer, California State College at Los Angeles and California State Polytechnic College, Pomona; teacher and chairman of Social Studies Department, Gage Junior High School, Huntington Park.
- CONNER, E. WESLEY (1963)** Ornamental Horticulture
 B.S., California State Polytechnic College, 1956; graduate study, California State Polytechnic College.
 Experience: Manager, Landscape Department, Yosemite Park & Curry Company; landscape consultant, Spencer & Lee, Architects, San Diego and Napa County; assistant to landscape architect, Huettig & Schromm, Palo Alto; Registered Landscape Architect, California.
- CONWAY, JAMES R. (1969)** Speech Communication
 B.A., California State College at Los Angeles, 1966; M.A., 1968; additional graduate study, University of Southern California.
 Experience: Instructor, San Fernando Valley State College; graduate assistant, California State College at Los Angeles.
- COOK, BARBARA E. (1972)** Social Sciences
 A.B., Duke University, 1965; M.A., Stanford University, 1967; additional graduate study, Stanford University.
 Experience: Field work, Fiji Islands; predoctoral and research fellow, National Institute of Mental Health; lecturer, Mills College.
- COOK, DAVID W. (1941)** Associate Dean, Curriculum and Instruction
 B.S., University of California, 1937.
 Experience: Examiner, Board of Fire Underwriters of the Pacific; engineer, Insurance Company of North America; instructor, electrical engineering and mathematics; coordinator of navigation instruction, U.S. Naval Flight Preparatory School; registrar; chairman, Mathematics Department, California State Polytechnic College.
- COOMBS, LEE CHARLES (1969)** Chemistry
 B.A., San Diego State College, 1963; M.S., 1965; Ph.D., Purdue University, 1970.
 Experience: Teaching assistant and spectroscopist, San Diego State College; instructor, Purdue University.

Faculty and Staff

COOPER, ALAN F. (1970) Biological Sciences
B.S., California State Polytechnic College, Pomona, 1964; Ph.D., University of California, Riverside, 1969.

Experience: NDEA Fellowship, research assistant, postgraduate research nematologist, University of California, Riverside.

COTA, HAROLD M. (1965) Environmental Engineering
B.S., University of California, 1959; M.S., Northwestern University, 1960; Ph.D., Oklahoma University, 1966.

Experience: Graduate assistant, University of Oklahoma; research engineer, Lockheed Missiles; engineer, Westvaco (FMC); consultant, E.P.A. Air Pollution Training Grant; director, Central Coast Regional Water Quality Control Board.

COYES, FRANK G. (1965) Agricultural Engineering
B.S., California State Polytechnic College, 1950; M.A., 1957.

Experience: Instructor, Coalinga Union High School, Coalinga College.

CRANE, FRANKLIN S. (1958) Mechanical Engineering
Petroleum Engineer, Colorado School of Mines, 1943; graduate study, Massachusetts Institute of Technology.

Experience: Division engineer, Oil Well Supply Company; chief engineer, Martin-Decker Corporation; secretary-treasurer and director, Decker Engineering Corporation; officer, U.S. Navy; registered petroleum engineer, California.

CRIVELLO, JOHN H. (1971) Men's Physical Education
B.S., California State University, San Jose, 1969; M.S., California Polytechnic State University, 1970.

Experience: Graduate assistant, California Polytechnic State University, San Luis Obispo.

CRUIKSHANKS, RANDAL L. (1972) Political Science
B.A., University of California, Berkeley, 1963; M.A., University of Oregon, 1965; Ph.D., 1968; additional graduate study, University of Michigan.

Experience: Research assistant, University of Oregon; consultant, Oregon Research Institute; instructor, Division of Continuing Education, Office of Academic Advising, and School of Community Service and Public Affairs, University of Oregon; Captain, U.S. Army; assistant professor, University of New Mexico.

CULBERTSON, JAMES T. (1953) Head, Philosophy Department
A.B., Yale University, 1934; Ph.D., 1940; other graduate study, University of Pennsylvania.

Experience: Research fellow, Yale University; professor, mathematics and physics, Cumberland University; head of mathematics department, Southwestern University; research associate mathematical biology, University of Chicago; assistant professor of philosophy, University of Southern California; research associate Rand Corporation; research psychologist, UCLA.

CUMMINS, CARL C. (1958) Dean, School of Human Development and Education
A.B., University of California, Santa Barbara, 1948; M.S., University of Southern California, 1952; Ed.D., University of California, 1957.

Experience: Construction supervisor, National Shipbuilding Corporation, San Diego; plant engineer, Ryan Aeronautical Co.; professor, San Diego State College; engineer, General Electric Company.

CURTIS, CHARLES D. (1968) Mathematics
A.B., San Diego State, 1965; M.S., 1967; additional study, University of California, Santa Barbara.

Experience: Teaching assistant, San Diego State College; research assistant, University of California, Santa Barbara.

- CURTIS, DONALD J. (1960)**.....Senior Clinical Laboratory Technologist
B.N., Hospital Corps, Medical Department, U.S. Navy.
Experience: Chief warrant officer, USN; nursing and laboratory service, USNH; laboratory service, USNH, Pearl Harbor; personnel and medical records, USNH; Epidemiology Control Units, Pearl Harbor; administrative officer, Fourth Marine Division; assistant medical property and accounting officer, Camp Pendleton; clinical laboratory technologist, Patton State Hospital; senior clinical laboratory technologist, Atascadero State Hospital.
- CURTIS, WILLIAM D. (1961)**.....Psychology
B.A., University of Redlands, 1948; M.A., University of California, Los Angeles, 1951; Ph.D., University of Denver, 1960.
Experience: Probation officer, Riverside County, California; school psychometrist, San Bernardino City Schools; teacher, San Bernardino High School; instructor, San Bernardino Valley College; part-time instructor, University of Redlands, University of Denver, International Business Machines Corporation.
- CURZON, GORDON (1970)**.....English
B.S., DePaul University, 1941; B.A., St. Mary's College, 1945; M.A., Western Washington State College, 1966; Ph.D., University of California, Riverside, 1969.
Experience: Research chemist, industrial editor, Georgia-Pacific Corporation; teaching assistant, University of California, Riverside; instructor, College of the Desert.
- CUTLER, JOHN P. (1971)**.....Architecture
B.Arch, Massachusetts Institute of Technology, 1941; M.Arch, 1943.
Experience: Designer, Raymond Loewy Associates, New York; chief draftsman and designer, Clarence Mayhew, San Francisco; designer and job captain, John Lyon Reid & Partners, San Francisco; guest professor in Architecture, Bengal Engineering College; project architect, Reid, Rockwell, Banwell & Tarics, San Francisco; project architect, Rockwell & Banwell, Architects, San Francisco; associate, Reid & Tarics, Inc., San Francisco. Registered architect, California.
- D'ALBRO, JAMES A. (1969)**.....Ornamental Horticulture
B.S., Cornell University, N.Y., 1966; M.S., University of California, Davis, 1969.
Experience: Part-time county agricultural agent, commercial greenhouse worker; Research Assistant, University of California, Davis; General Production Manager, commercial cut flowers, Goro Kawai, Inc., Salinas, California.
- DALY, JAMES C. (1972)**.....Computer Science and Statistics
B.S., Gonzaga University, 1966; graduate study, Oregon State University.
Experience: Instructor, teacher and research assistant, Oregon State University.
- DARNIELLE, MAX E. (1967)**.....English
B.S., University of Oregon, 1950; M.S., Indiana University, 1967; additional graduate study, Indiana University.
Experience: Teacher, South San Francisco, Oakland, Cincinnati, Columbus; teaching assistant, university fellow, Indiana University.
- DATTA, SAMIR KUMAR (1968)**.....Electronic and Electrical Engineering
B.E.E., Jadavpur University, Calcutta, India, 1958; M.S., University of Manchester, England, 1963; Ph.D. 1966.
Experience: Graduate Trainee, Askania-Werke, West Berlin, Germany; engineer Valvo GMBH, Hamburg, W. Germany; demonstrator, University of Manchester, England; application engineer, General Electric Company, New York; systems engineer, General Electric Company, Pennsylvania.
- DAVIDSON, OTTO C. (1968)**.....Mechanical Engineering
B.S., Bucknell University, 1955; M.S., Massachusetts Institute of Technology, 1956; Ph.D., Stanford University, 1960.
Experience: Assistant professor, University of Utah, Robert College; officer, U.S. Army; engineer, various engineering firms in New York, Utah, California.

Faculty and Staff

- DAVIES, GEORGE R., II (1962) Admissions Officer
 B.S., University of Pittsburgh, 1939; Command and General Staff College, 1960.
 Experience: Assistant professor of military science, California State Polytechnic College; assistant professor of military science, Valley Forge Military Academy; training officer, 1st Guided Missile Group, Fort Bliss; executive officer and battalion commander, Fifth Howitzer Battalion, Korea.
- DAVIS, CHARLES P. (1958) Head, Aeronautical Engineering Department
 B.S., Rensselaer Polytechnic Institute, 1948.
 Experience: Instructor and assistant professor, Rensselaer Polytechnic Institute; development engineering and product engineer leader, General Electric Company.
- DEAN, ARNOLD M. (1949) Soil Science
 B.S., University of Alberta, Canada, 1943; M.S., 1946; Ph.D., University of Wisconsin, 1949.
 Experience: Laboratory assistant, Dominion Department of Agriculture, Edmonton, Alberta; teaching assistant, University of Wisconsin; industrial fellowship, University of Wisconsin.
- DELANY, JAMES E. (1970) Mathematics
 A.B., San Diego State College, 1961; Ph.D., Iowa State University, 1966.
 Experience: Graduate assistant, Iowa State University; assistant professor, University of California, Irvine.
- DE LEY, WARREN W. (1971) Social Sciences
 A.B., Stanford University, 1956; M.A., 1957; M.A., University of California, Los Angeles, 1963; C. Phil., 1968; Ph.D., 1970.
 Experience: Teacher, California public schools; Flint Fellowship and teaching assistant, University of California, Los Angeles; director of institutional studies, Sacramento State College; lecturer in sociology, California State College, Bakersfield.
- DELVAGLIO, PETER A. (1970) Graphic Communications
 B.S., Rochester Institute of Technology, 1963; graduate study, Bridgeport University, California Polytechnic State University.
 Experience: Graphic arts salesman, Darien Review, Connecticut; printing liaison, information specialist, U.S. Army, Vicenza, Italy; production control, Northwest Publishing, Connecticut; instructor, Stamford school system, Connecticut.
- DEMPSEY, PAUL L. (1970) Business Administration
 B.B.A., University of Miami, 1951; J.D., 1956; L.L.M., New York University, 1958.
 Experience: Editor, Prentice-Hall, Inc., New Jersey; attorney, Miami; legal staff, American Telegraph & Telephone Co., New York; chief counsel, New York State Senate Judiciary Committee; real estate broker.
- DETTLOFF, ERLAND G. (1967) Education
 B.S., Minot State College, 1956; M.A. University of Wyoming, 1962; Ed.D., 1963.
 Experience: Teacher, Great Falls, Montana; visiting professor, part-time instructor, assistant professor, University of Wyoming; assistant professor, Northern State College, South Dakota.
- DE VOROS, EVELYN K. (1955) Speech Communication
 B.A., University of Texas, 1936; M.A., University of Michigan, 1941; Ph.D., University of Michigan, 1945.
 Experience: Instructor in Texas Public Schools; instructor, Louisiana Polytechnic Institute; assistant professor, Bowling Green State University, Ohio, University of California, Santa Barbara College.
- DICKERSON, ROBERT H. (1970) Physics
 B.S., University of Arizona, 1959; M.S., 1963; Ph.D., 1964.
 Experience: Physicist, U.S. Naval Ordnance Laboratory; teaching and research assistant, University of Arizona; postdoctoral research associate, University of Illinois; assistant professor, California State College, Hayward.

DICKEY, RICHARD K. (1956) Electronic and Electrical Engineering
B.S., University of California, 1948; M.S., 1956; Ph.D., University of California, Santa Barbara, 1969.

Experience: Project engineer, Berkeley Scientific Co.; design engineer, Remler Co., Ltd.; engineer, Alameda Naval Air Station. Registered professional engineer, California.

DICKINSON, ROBERT W. (1970) Education
B.A., Stanford University, 1933; M.A., University of California at Los Angeles, 1950; Ed.D., 1969.

Experience: Junior high teacher, Long Beach Unified School District; elementary teacher, elementary principal, Director of Educational Services, assistant superintendent-instruction, Palos Verdes School District; district superintendent, La Verne City School District, Bonita Unified School District.

DICKSON, BRUCE A. (1952) Soil Science
B.S.A., University of British Columbia, Canada, 1940; M.S.A., 1942; Ph.D., University of California, Berkeley, 1952.

Experience: Teaching assistant, University of British Columbia; teaching assistant, University of California at Berkeley; assistant in plant nutrition, Dominion Experimental Station, Saanichton, B.C.; soil specialist; Dominion Experimental Farm, Agassiz, B.C.

DILLS, CHARLES E. (1963) Chemistry
B.S., North Dakota State University, 1949; M.S., George Washington University, 1951; Ph.D., Harvard University, 1956; additional graduate study, Columbia University.

Experience: Professor, Deep Springs College; assistant editor, American Chemical Society; chemist, National Research Corporation; assistant professor, Northwest Missouri State College.

DILTS, RALPH W. (1944) History
A.B., Montana State University, 1936; M.A., 1938; additional graduate study, University of California, 1940-41.

Experience: Stevensville High School, Stevensville, Montana; graduate assistant, Montana State University; graduate assistant, University of California; U.S. Bureau of Reclamation.

DONALDSON, DOUGLAS D. (1968) Biological Sciences
A.B., University of California, Berkeley, 1962; M.A., California State College, Los Angeles, 1964; Ph.D., Oklahoma State University, 1969.

Experience: Herbarium assistant, University of California, Berkeley; unit fellow, Oklahoma Cooperative Wildlife Research Unit, Oklahoma State University; instructor and assistant professor, California State College, Los Angeles.

DONANT, FRANKLIN D. (1972) Program Counselor
B.A., University of California, Santa Barbara, 1967; M.A., California Polytechnic State University, San Luis Obispo, 1972.

Experience: Teacher, Horace Mann Junior High School; head resident and student activities graduate assistant, California Polytechnic State University, San Luis Obispo.

DOPP, JAMES W. (1969) Library
A.B., Franklin and Marshall College, 1965; M.S.L., Western Michigan University, 1966.

Experience: Cataloger, Detroit Public Library.

DOURSON, ROBERT H. (1967) Computer Science and Statistics
B.S., California Institute of Technology, 1935; M.S., 1941; Ch.E., 1942; additional graduate study, Case Institute of Technology, Southern Illinois University.

Experience: Laboratory chemist, research chemical engineer, Union Oil Company; research chemist, Cutter Laboratories; laboratory assistant, California Technology; various engineering and administrative positions, Shell Oil Company.

Faculty and Staff

- DRANDELL, MILTON (1972)** Business Administration
 B.A., Southern Methodist University, 1944; M.A., University of Texas, 1945; Ph.D., University of California at Los Angeles, 1951.
 Experience: Instructor, Mathematics Department, Southern Methodist University, University of Southern California; operations research consultant, Hughes Aircraft Company, Northrop Aircraft Company; operations research, Management Science and Computer Systems; consultant and manager, International Business Machines Corporation; lecturer, visiting associate professor, Graduate School of Management, University of California at Los Angeles; management consultant, private sector and U.S. Federal Government.
- DRAVES, ALBERT W. (1969)** Architecture
 B.S.M.E., Purdue University, 1948; B.S.C.E., Rensselaer Polytechnic Institute, 1952; M.B.A., Roosevelt University, 1962; additional graduate study, Arizona State University, University of Michigan.
 Experience: Civil Engineer Corps, U.S. Navy; director, Operational Development Division, Rex Chainbelt, Inc.; manager, Industrial Building Design Division, De Leuw, Cather & Co., Chicago; instructor, Purdue University. Registered professional civil and mechanical engineer, New York, Louisiana, Indiana, Illinois, California. Registered land surveyor.
- DUARTE, ARTHUR C. (1967)** Agricultural Management
 B.S., California State Polytechnic College, 1964; M.S. Oregon State University, 1965.
 Experience: Farming.
- DUNDON, STANISLAUS J. (1970)** Philosophy
 B.A., Mt. Carmel College, 1962; M.A., St. John's University, 1965; Ph.D., 1972.
 Experience: Teaching fellow, St. John's University; lecturer, University of Santa Clara; consultant, Brash-Newton Collection in History of Scientific Thought, Stanford University Libraries.
- DUNIGAN, LOWELL H. (1961)** Director, Institutional Research
 B.S., Iowa State University, 1947; M.S., 1948; additional graduate study, University of Southern California.
 Experience: Officer, U.S. Navy; instructor in sociology, Iowa State University; claims adjuster, Employers Mutuals Insurance Company; research technician, California Highway Planning Survey; research technician, California State Department of Education, Division of State Colleges and Teacher Education.
- DUNN, JOHN E. (1961)** Agricultural Engineering
 B.S., Oregon State University, 1943; M.A., California State Polytechnic College, 1967; M.S., University of Hawaii, 1970.
 Experience: Engineering officer, USNR; service supervisor, wholesale farm machinery, Los Angeles, and retail farm machinery, Bakersfield, Calif., and Yuma, Arizona; instructor, California State Polytechnic College.
- DUNN, WESLEY T. (1959)** Graphic Communications
 Experience: Instructor, Compton High School; rotary press operator, Moore Business Forms; 17 years experience as composition-press operator for various printing firms.
- DUSEK, BERNARD W. (1965)** Art
 A.B., University of California, 1951; M.A., University of Southern California, 1955.
 Experience: Instructor, Bellflower Unified School District, Fullerton Junior College, Palomar Junior College.
- DYE, ELISABETH (1961)** Physical Therapist
 B.A., University of Colorado, 1946; Physical Therapy Certificate, University of Kansas, 1947.
 Experience: Tucson Medical Center, Arizona; Kabat Kaiser Institute, Vallejo; Mills Memorial Hospital and San Mateo Clinic, San Mateo; University of Utah, Salt Lake City.

- EASTHAM, GEORGE M. (1966)**.....Economics
 B.A., Chico State College, 1961; M.A., University of California, Santa Barbara, 1965; additional graduate study, University of California; Claremont Graduate School.
 Experience: Revenue officer, Internal Revenue Service; teaching assistant and research assistant, University of California, Santa Barbara.
- EATOUGH, NORMAN L. (1968)**.....Chemistry
 B.S., Brigham Young University, 1947; B.E.S., 1958; M.S., 1959; M.S.Ch.E., 1960, Ph.D., 1968.
 Experience: Senior development engineer, Hercules Powder Company; assistant professor, Dixie Junior College; instructor, Brigham Young University.
- EDMISTEN, JOHN W. (1968)**.....Architecture
 B.S. Arch. Engr., California State Polytechnic College, 1965; M.Engr., University of California, Berkeley, 1967.
 Experience: Teaching assistant, University of California, Berkeley; project engineer-designer, Reid & Tarics, Architects and Engineers; draftsman, Kenneth Vinolia, Structural Engineer; designer-draftsman, Walter Constant, Structural Engineer. Registered architect, California.
- EHRENBURG, OTTO (1971)**.....Architecture
 B.A., University of Denver, 1925; M.A., University of Colorado, 1928; B.S.E.E., 1932.
 Experience: Staff engineer, Woodward, Clyde & Associates, Inc.; senior engineer, International Power and Engineering Consultants, Ltd.; soils/concrete technician, San Francisco Water Department; construction inspector, E. Bay Municipal Utility District; engineering analyst, Dames & Moore; chief technical inspector, PG&E, Kings River Project; soils technician, Coast Laboratories, Fresno; assistant foundation engineer, O. J. Porter; soils engineer, Twining Laboratories; engineer, U.S. Bureau of Reclamation; Major, U.S. Army; assistant engineer, U.S. Bureau of Reclamation; instructor, Spokane University; instructor, University of Idaho; geophysicist, Midwest Refining Company; assistant instructor, University of Colorado; field engineer, Geophysical Research Corporation.
- ELLERBROCK, GERALDINE B. (1973)**.....Business Administration
 B.S., Ohio State University, 1941; M.S., 1967; Ph.D., 1969.
 Experience: Assistant professor, University of Dayton.
- ELLIOTT, WALTER E. (1965)**.....Physics
 B.S., McNeese State College of Louisiana, 1954; M.Ed., Northwestern State College of Louisiana, 1957; M.S., 1963; Ph.D., The University of Arizona, 1972.
 Experience: Teaching fellow, Northwestern State College of Louisiana; assistant professor of physics and mathematics, Springfield College.
- ELTZROTH, THOMAS E. (1967)**.....Ornamental Horticulture
 B.S., The Ohio State University, 1965; M.S., 1966.
 Experience: Research fellow, The Ohio State University.
- EMMEL, JAMES R. (1967)**.....Head, Speech Department
 B.A., Eastern Nazarene College, 1945; Speech Therapy Certification, Northwestern University, 1946; M.A., University of Oklahoma, 1950; Ph.D., Pennsylvania State University, 1959.
 Experience: Chairman, Department of Speech, Bethany Nazarene College; part-time instructor, Pennsylvania State University; speech consultant, U.S. Dependent Schools, Germany; Fulbright professor, Italy; chairman, Division of Letters, full professor of speech, Pasadena College.
- EMMONS, MICHAEL L. (1968)**.....Counselor
 B.S., Illinois State University, 1963; M.S., 1964; Ph.D., University of Wyoming, 1968.
 Experience: Graduate assistant, Counseling Center, University of Wyoming; counselor-teacher, Palatine High School, Illinois; residence hall counselor, Illinois State University; U.S. Navy.

Faculty and Staff

ENDRES, LELAND S. (1969).....Chemistry
A.B., Middlebury College, 1958; M.A., University of Oregon, 1963; Ph.D., University of Arizona, 1966.

Experience: Research and teaching assistant, University of Oregon, University of Arizona; research associate, instructor, University of Nebraska; senior research chemist, 3M Company.

EPSTEIN, GARY M. (1969).....Mathematics
B.A., University of California at Riverside, 1964; Ph.D., 1969.

Experience: Research assistant, Riverside Cement Co., University of California, Riverside.

ERICSON, JON M. (1970).....Dean, School of Communicative
Arts and Humanities
B.A., Pacific Lutheran College, 1952; M.A., Stanford University, 1953; Ph.D., 1961.

Experience: Professor and head of Department of Speech and Drama, Central Washington State College; assistant professor and Director of Forensics, Stanford University; assistant professor, Pacific Lutheran College; instructor, Texas Lutheran College.

ERNATT, EDWARD J. (1958).....Education
A.B., Wayne State University, 1946; M.Ed., 1950; Ed.D., University of Michigan, 1956.

Experience: Elementary schoolteacher, Taylor Center Schools, Inkster, Michigan; district superintendent, Nankin-Dearborn Schools, Inkster, Michigan; elementary schoolteacher, Santa Barbara, California; supervising teacher, University of California, Santa Barbara College; district superintendent, West Park School District, Fresno, California.

EVANS, BERNARD B. (1970).....Computer Science and Statistics
B.A., Long Beach State College, 1959; M.S., Kansas State University, 1962; Ph.D., Purdue University, 1964.

Experience: Member of technical staff, Space Technology Laboratories; research assistant, Kansas State University; research associate, Purdue University; member of technical staff, Aerospace Corporation; advisory engineer, IBM; senior staff engineer, Geodynamics Corporation.

EVANS, HAROLD D. (1965).....English
B.A., Duke University, 1949; M.A., Columbia University, 1956; additional graduate study, Columbia University.

Experience: Instructor, Fairfax Public Schools, South Carolina; public information specialist, U.S. Air Force; instructor, McBurney School, New York City; registrar for graduate faculties, Columbia University; free-lance writer; research and writing, U.S. Office of Education; instructor, Texas Western College; lecturer, American University, Washington, D.C.; assistant professor, St. Andrews College, Laurinburg, North Carolina.

EVANS, J. HANDEL (1970).....Architecture
Diploma of Architecture, University of Manchester, England, 1965; M. Arch., University of Oregon, 1967; additional graduate study, University of Cambridge, England.

Experience: Lecturer, California State Polytechnic College, San Luis Obispo; research assistant, Bureau of Municipal Research, Oregon; teaching assistant, University of Oregon; design architect, R. Seifert, Architects; senior assistant architect, Tripe & Wakeham. Registered architect, England.

EYLER, MARY F. (1960).....Associate Director, Financial Aids
B.S., Western Michigan University, 1959; graduate study, California State Polytechnic College.

Experience: Secretary, Simplex Paper Corporation, Adrian, Michigan; Ford Motor Company, Dearborn, Michigan; intermediate stenographer; placement interviewer and Placement Supervisor, California State Polytechnic College; business teacher, San Luis Obispo Adult Evening School; financial aid counselor, California State Polytechnic College.

FABRICIUS, EUGENE DAVID (1970).....Electronic and Electrical Engineering
B.S., Missouri School of Mines, Rolla, 1956; M.S., 1958; D.Sc., Newark College of Engineering, New Jersey, 1968.

Experience: Associate professor, Rochester Institute of Technology, Rochester, New York; assistant professor, Newark College of Engineering, New Jersey; National Science Foundation Faculty Fellow; senior physicist, Giannini Controls Corporation, Pasadena, California; development engineer, Texas Instruments, Inc., Dallas, Texas; instructor, Texas A. & M., College Station, Texas.

FALKENSTERN, OSWALD J. (1953).....Mathematics
B.S., Montana State College, 1939; M.S., San Jose State College, 1952; additional graduate study, University of Colorado, Colorado A & M College.

Experience: High school teacher and coach, Baker and Opheim, Montana; air navigation officer, U.S. Navy; mathematics instructor, Colorado A. & M. College; instructor and chairman of junior high school mathematics, Salinas.

FARR, RICHARD W., CPT. (1973).....Military Science
B.S., U.S. Military Academy, West Point, 1967; Infantry Officers Basic Course, Ranger Course, Airborne School, 1967; 82nd Airborne Jumpmaster Course, 1968; Rotary Wing Flight School, 1970; Armor Officer's Advanced Course, 1971; graduate study, California Polytechnic State University, 1973.

Experience: Platoon leader, 82nd Airborne Division, Fort Bragg; platoon leader, 101st Airborne Division, Vietnam; company commander, USATC, Fort Polk.

FARRELL, GERALD P. (1970).....Mathematics
A.B., San Diego State College, 1961; M.S., 1963; Ph.D., University of California, Los Angeles, 1968.

Experience: Research assistant, University of California, Los Angeles; assistant professor, California State College, Los Angeles, and Hawaii Loa College, Honolulu.

FARRELL, WARREN S. (1967).....Agricultural Management
B.S., California State Polytechnic College, 1963; M.S. University of California, Davis, 1964; Ph.D., 1968.

Experience: Research assistant, Department of Agricultural Economics, University of California, Davis.

FEDERER, M. DALE (1963).....Psychology
B.S., University of Wyoming, 1961; M.Ed., 1961; Ph.D., 1962.

Experience: Officer, U.S. Army; instructor, Saratoga School District, Wyoming; assistant instructor, extension instructor and assistant professor, University of Wyoming.

FELDMAN, JACOB (1971).....Architecture
B.S., Civil Engineering, University of Delaware, 1961; M.S., 1968.

Experience: Structural engineer, Simpson, Stratta & Associates, San Francisco; structural designer, Forell/Elsesser, Engineers, San Francisco; architectural engineer, Breck & Associates, Delaware; design engineer, GE Missile/Space Center, Pennsylvania; structural designer, David Bloom, Inc.; highway engineer, U.S. Peace Corps, Washington, D.C.

FENNEMA, FREDERICK F. (1970).....Industrial Engineering
B.S., Oklahoma State University, Stillwater, Oklahoma, 1941; M.S., 1962; Ph.D., 1964.

Experience: Civilian operations analysis, U.S. Air Force; technical director plans and requirements, National Range Division (Global Launch Range); deputy chief operations analysis, Military Airlift Command; professor, chairman Operations Research Department, Dean of Graduate School, Florida Institute of Technology.

FETTERS, MERTON D. (1970).....Veterinary Science
D.V.M., University of Minnesota, 1952; Ph.D., University of California, 1970.

Experience: Mixed veterinary practice, Newton, Iowa; dairy cattle practice, Moose-Lake, Minnesota.

Faculty and Staff

- FIERSTINE, HARRY L. (1966)** Biological Sciences
 B.S., Long Beach State College, 1957; M.A., University of California, Los Angeles, 1961; Ph.D., 1965.
 Experience: Student assistant, Los Angeles County Museum; teaching and research assistant, cardio-vascular trainee, University of California, Los Angeles; instructor, Long Beach State College.
- FINCH, HARRY C. (1962)** Biological Sciences
 B.S., Iowa State University, 1946; M.S., 1947; Ph.D., 1950.
 Experience: Instructor, Iowa State University; research associate, Iowa State University; assistant professor, North Carolina State College, Agricultural Experiment Station; associate professor, Pennsylvania State University; project leader, fungicide and nematocide research, Monsanto Chemical Company, St. Louis, Missouri.
- FISHER, CLYDE P. (1947)** Dean, School of Science and Mathematics
 A.B., University of Oklahoma, 1942; M.A., University of Southern California, 1947; Ph.D., 1955.
 Experience: Teaching assistant in mathematics, lecturer in mathematics, University of Southern California; officer, U.S. Army; instructor, mathematics; assistant to the dean, Liberal Arts Division; assistant to the executive dean; building program co-ordinator, executive secretary to the President's Cabinet; supervisor of Special Studies Staff; Dean, Educational Services and Curriculum Development; Dean of the College, California State Polytechnic College.
- FITTS, JAMES L. (1967)** History
 A.B., Seattle University, 1950; M.A., University of Washington, 1951; Ph.D., University of California, Los Angeles, 1970.
 Experience: Teacher, All Hallow's High School; claims supervisor, Social Security Administration; assistant professor, Immaculate Heart College, San Fernando Valley State College.
- FLAKE, GERRY R. (1969)** Agricultural Management
 B.S., Arizona State University, 1966; M.S., Utah State University, 1967.
 Experience: Research assistant, Utah State University; assistant manager, Southwestern Regional Commodity Buying Office, Ralston Purina Company, Fort Worth, Texas; ranching, northern Arizona.
- FLANAGAN, JAMES ROBERT (1959)** Animal Science
 B.S., California State Polytechnic College, 1959.
 Experience: Rancher.
- FOLSOM, VOLMAR A. (1946)** Mathematics
 B.S., Iowa State College, 1934; M.E., Colorado University, 1937; additional graduate study, Southern Methodist University.
 Experience: High school and junior college teaching; officer, U. S. Navy; assistant professor, mathematics, Southern Methodist University; coordinator, relations with schools, California State Polytechnic College.
- FOSTER, THEODORE C. (1970)** Physics
 B.S., University of Santa Clara, 1961; M.S., University of Washington, 1963; Ph.D., 1965.
 Experience: Assistant engineer, Boeing Scientific Research Labs; research assistant and teaching assistant, University of Washington; assistant research physicist and lecturer, University of California at San Diego; assistant professor, University of Idaho, Montana State University.
- FOTTER, MILLARD J. (1954)** Industrial Engineering
 B.S., Armour Institute of Technology, 1935; M.S., University of Southern California, 1956.
 Experience: Officer, U. S. Air Force; sales engineer, Stanley E. Morris Co., Los Angeles; production engineer, Southland Paper Co., Los Angeles; industrial engineer, Southwestern Engineering Co., Los Angeles; industrial engineer, International Harvester Co., Chicago and Memphis. Registered professional engineer, California.

Faculty and Staff

- FOUNTAIN, H. PAUL (1965)**.....Crop Science
B.S., California State Polytechnic College, 1963.
Experience: Orchard manager, Ballico, California; agriculture inspector, Santa Barbara County.
- FOWLER, ANNE C. (1965)**.....Social Sciences
B.A., Douglass College, 1939; M.A., Vanderbilt University, 1959; Ph.D., Tulane University, 1970.
Experience: Assistant professor, Nevada Southern University; assistant research sociologist, Council of Social Agencies, New Orleans; research sociologist, Charity Hospital, New Orleans.
- FOX, FRANK W. (1957)**.....Animal Science
B.S., California State Polytechnic College, 1951; M.A., 1957.
Experience: Director of vocational agriculture, Lassen Union High School, Susanville.
- FREY, DENNIS F. (1970)**.....Biological Sciences
B.S., Oklahoma State University, 1963; M.S., Virginia State College, 1967; Ph.D., Oklahoma State University, 1970.
Experience: Instructor in biology, Classen High School, Oklahoma City Public School District; teaching and research assistant, Oklahoma State University.
- FREY, THOMAS G. (1970)**.....Chemistry
B.A., University of Oregon, 1965; Ph.D., University of Idaho, 1970.
Experience: Technician, University of Oregon; technician, analyst and teaching assistant, University of Idaho.
- FREY, WINTON H. (1972)**.....Ornamental Horticulture
B.S., California State Polytechnic College, 1958; M.S., Fresno State University, 1972.
Experience: Graduate teaching and research assistant, University of Washington, School of Botany; instructor, San Luis Obispo Unified School District, Allan Hancock College, California State Polytechnic College; environmental control consultant, Pacific Gas & Electric Company and Kaiser Steel Company Sand & Gravel Division; garden columnist.
- FREITAG, FREEMAN (1966)**.....Electronic and Electrical Engineering
B.S., Arizona State University, 1963; M.S., 1965.
Experience: Engineer, Motorola Semiconductors, Bell Aero Systems.
- FRIEND, KATHLEEN D. (1970)**.....Home Economics
B.S., Northern Illinois University, 1967; M.S., Ohio State University, 1968.
Experience: Trainee, Carson, Pirie & Scott, Chicago; clothing and textile instructor, Western Illinois University; art teacher, Marion Community Schools, Indiana.
- FRIETZSCHE, ARTHUR H. (1965)**.....English
B.A., University of California, 1944; M.A., 1945; Ph.D., 1949.
Experience: Teaching assistant, lecturer, University of California; supervisor, technical publications, General Electric Company; associate professor, Utah State University.
- FROGGATT, CLARA B. (1964)**.....Psychometrist
B.A., University of Wyoming, 1940; M.A., California State Polytechnic College, 1968.
Experience: Teacher, Secondary School, Wyoming; personnel department, United Air Lines.
- FROST, JACK D. (1969)**.....Industrial Technology
B.S., Arizona State University, 1959; M.A., California Polytechnic State University, 1972.
Experience: Development engineer, Airesearch Mfg. Co., Phoenix, Arizona; associate professor, Oregon Technical Institute; senior research engineer, Lockheed Missile and Space Co.; lecturer, South Australian Institute of Technology; project engineer, General Motors, Woodville, South Australia; senior research engineer, Lockheed Missile and Space Company.

Faculty and Staff

- FROST, ROBERT H. (1953)**.....Head, Physics Department
A.B., University of California, 1939; M.A., 1945; Ph.D., 1947.
Experience: Teaching assistant, University of California; assistant professor, University of Missouri.
- GALVEZ, CONNIE J. (1970)**.....Graduate Nurse
B.S., Fresno State College, 1968.
Experience: Staff nurse, Arroyo Grande Hospital and San Leandro Community Hospital; Visiting Nurses Association of Northern Santa Barbara County; public health nurse, Alameda County Children and Youth Project.
- GANG, DONNA D. (1967)**.....Graduate Nurse
R.N., Regina General Hospital, Saskatchewan; additional studies, Jersey City Medical Center, Greystone Park, New Jersey.
Experience: Regina General Hospital, Morristown Memorial Hospital, New Jersey; Weyburn Union Hospital, Saskatchewan; Sierra Vista Hospital, San Luis Obispo.
- GARNER, EDWARD R. (1967)**.....Mechanical Engineering
B.S., Bradley University, 1962; M.S., University of Arizona, 1965.
Experience: Instructor, Rose Polytechnic Institute; graduate assistant, University of Arizona; mechanic, Groskorth Marine.
- GASKIN, TIMOTHY A. (1970)**.....Ornamental Horticulture
B.S., University of California, 1954; M.S., University of Delaware, 1956; Ph.D., Purdue University, 1958; M.B.A., Ohio State University, 1968.
Experience: Plant breeder, Asgrow Seed Co., New Haven, Connecticut; Turf-grass Improvement and Research, Warren's Turf Nursery, Palos Park, Illinois; pesticide development and turf research, O. M. Scotts & Sons, Marysville, Ohio.
- GATES, VINCENT J. (1958)**.....Journalism
B.S., University of Oregon, 1939; graduate study, Sacramento State College.
Experience: Editorial positions on daily newspapers in San Francisco, San Jose, Santa Rosa, Salinas; industrial editorial positions, Henry J. Kaiser Industries; public relations and press positions, U. S. Navy, California State Employees Association, California State Polytechnic College.
- GATZMAN, MICHAEL A. (1971)**.....Agricultural Management
B.S., California State Polytechnic College, 1967; M.A., Washington State University, 1969.
Experience: Teaching and research in Ag Business Management, Washington State University; cow-calf and cattle feeding, California.
- GEDAYLOO, TEYMOOR (1965)**.....Physics
B.A., Macalester College, 1957; M.S., University of Washington, 1959; Ph.D., University of Kansas, 1973.
Experience: Laboratory assistant, chief laboratory supervisor, University of Washington; instructor, Lawrence College; teacher and research associate, Argonne National Laboratory.
- GENEREUX, DOUGLAS G. (1970)**.....Agricultural Management
B.S., University of Nebraska, 1964; M.S., University of Nebraska, 1969.
Experience: Economic research associate for Management Research Associates, Corvallis, Oregon; administrative assistant to dean of international programs, and graduate assistant, Department of Agriculture Education, University of Nebraska, Lincoln; instructor, Nehawka Consolidated Schools, Nehawka, Nebraska.
- GENTHNER, FREDERICK L. (1952)**.....Library
B.A., Ohio Wesleyan, 1940; B.S. in L.S., George Peabody, 1941; A.M.L.S., University of Michigan, 1950.
Experience: Periodicals librarian, Ball State Teachers College; officer, U. S. Army; assistant reference librarian, Ohio State University.

- GEORGE, DAVID L. (1970).....Political Science
A.B., San Diego State College, 1962; M.A., 1968; Ph.D., University of Oregon, 1970; additional graduate study, University of Michigan Survey Research Center.
Experience: Sales management, Campbell Soup Company; teaching assistant, San Diego State College; teaching and research assistant, University of Oregon; N.I.M.H. post-doctoral fellow in political psychology, Yale University.
- GERALD, CURTIS F. (1964).....Computer Science & Statistics
B.S., Iowa State University, 1936; M.S., University of Cincinnati, 1938; Sc.D., Massachusetts Institute of Technology, 1941; additional graduate study, University of Chicago Evening School.
Experience: Graduate assistant, University of Cincinnati, Massachusetts Institute of Technology; research fellow, Massachusetts Institute of Technology; research engineer, supervising research chemist, Universal Oil Products Co.; assistant professor, University of Washington; associate director of research, El Paso Natural Gas Products Co. Registered professional engineer, Illinois.
- GERARD, E. DOUGLAS (1951).....Executive Dean
B.S., University of British Columbia, 1950; M.S., University of Saskatchewan, 1951.
Experience: Instructor, University of British Columbia; instructor, University of Saskatchewan; shop superintendent, British Columbia Forest Products, Pitt Lake, British Columbia; service manager, Tractor and Allied Equipment, Limited, Mel-fort, Saskatchewan.
- GERNERT, ALEX M. (1969).....Engineering Technology
B.S., Cooper Union School of Engineering & Science, 1967; M.S., Stanford Uni-versity, 1968; additional graduate study, Santa Clara University, California State Polytechnic College.
Experience: Technical staff, Bell Telephone Laboratories, New Jersey; consultant, Lawrence Radiation Laboratory and Western Electric Company. Registered pro-fessional engineer, California.
- GERSTEN, ROY (1967).....Business Manager, Associated Students, Inc.
B.S., Sacramento State College, 1966; graduate study, Sacramento State College.
Experience: Staff adviser, Presidential Communications, White House Communi-cations Agency, The White House. Officer, U.S. Army.
- GIBFORD, WILLIAM R. (1955).....Animal Science
B.S., California State Polytechnic College, 1947.
Experience: Horse trainer, Ed Wright Stables and 1001 Ranch, Riverside; horse trainer and horseshoer, San Luis Obispo; employee, Humphrey Meat Packing Com-pany, San Miguel; Pacific Valley Cattle Company, King City; U.S. Marine Corps.
- GIBSON, J. CORDNER (1949).....Dean, School of Agriculture
and Natural Resources
B.S., University of California, 1937; M.S., University of Southern California, 1955.
Experience: Director of vocational agriculture, Downey and Whittier Union High Schools; U.S. Army; regional supervisor, Bureau of Agricultural Education; Dean, Student Personnel and Business Management, California State Polytechnic College, Kellogg-Voorhis.
- GILBERTSON, OSMUND S. (1968).....Head, Agricultural Education Department
B.S., University of Minnesota, 1958; M.A., 1966; Ph.D., 1969.
Experience: Director of agriculture and supervising teacher, St. Charles Consoli-dated High School, Minnesota; instructor, agricultural education and international programs manager, University of Minnesota.
- GINGRAS, LEONARD L., CPT (1971).....Military Science
B.A., University of South Florida, 1971; Army Engineering School, 1968; Army Aviation School, 1964.
Experience: Bridge engineer, Detroit, Toledo and the Iron-ton Railroad; highway engineer, San Luis Obispo, California; aviator instructor, Corps of Engineers; command and staff assignments in Vietnam, Thailand and U.S.

Faculty and Staff

- GIROLO, JACK E. (1970)**.....Mathematics
B.A., San Jose State, 1964; M.S., Iowa State University, 1966; Ph.D., 1971.
Experience: Programmer, Sylvania Electronic Systems West; instructor, Drake University; graduate assistant, University of Oklahoma, Iowa State University.
- GLASS, L. JOE (1970)**.....Agricultural Engineering
B.S., Purdue University, 1962; M.S., Texas A&M University, 1965; Ph.D., 1971.
Experience: Engineering aid and student trainee, Soil Conservation Service, Lafayette, Indiana; graduate assistant, instructor, Texas A. & M. University.
- GLASSCO, D. EDWARD (1968)**.....Mathematics
B.S., Harvey Judd College, 1963; M.A., University of California, Los Angeles, 1966; Ph.D., University of Southern California, 1971.
Experience: Teaching assistant, University of California, Los Angeles.
- GLIDDEN, WALLACE F. (1961)**.....Head, Veterinary Science Department
B.S., California State Polytechnic College, 1962; B.S., University of California, Davis, 1955; D.V.M., 1961.
Experience: U.S. Army Veterinary Corps; poultry research, U.C.D.; large and small animal practice, southern California.
- GOLD, MARCUS (1947-52) (1954)**.....Audio-Visual Service Coordinator
B.A., University of California, 1942; B.L.S., 1947; additional graduate study, University of California.
Experience: U.S. Army; library, University of California; audio-visual librarian, California State Polytechnic College; research assistant, University of California.
- GOLDBERG, SAUL (1970)**.....Electronic and Electrical Engineering
B.S., Fairleigh Dickinson University, New Jersey, 1963; M.E., University of Florida, Gainesville, 1964; Ph.D., 1968.
Experience: Associate planning engineer, Southern California Edison Co.; assistant professor, University of Miami, Coral Gables, Florida; research assistant, University of Florida, Gainesville; project engineer, Bendix Corporation, New Jersey; assistant engineer, Kearfott Company, Clifton, New Jersey.
- GOLDEN, JAMES R. (1966)**.....Industrial Engineering
B.S., U.S. Military Academy, West Point, 1945; M.S., Ohio State University, 1961.
Experience: Pilot-Navigator, Wing Director of Safety, Strategic Air Command; Reliability engineer, Chief of Reliability Quality and Maintainability, Space Systems Division; Chief of Technical Integration, Aero Systems Division, U.S. Air Force. Registered professional engineer, California.
- GOLDENBERG, STUART (1970)**.....Mathematics
B.S., University of California, Los Angeles, 1965; M.S., University of California, Riverside, 1969; Ph.D., 1970.
Experience: Teaching assistant and teaching fellow, University of California, Riverside; substitute teacher, Riverside Unified Schools.
- GOMES, GEORGE J. (1967)**.....Agricultural Management
B.S., California State Polytechnic, 1966; M.A., 1968.
Experience: Farming; restaurant manager.
- GONZALES, LEONARD A. (1972)**.....Relations With Schools Coordinator
B.A., University of Maryland, 1966; additional graduate study, Chapman College.
Experience: Project engineer, Radar project, India; world wide engineering project officer, Directorate HQ Ground-Electronic Engineering Installation Agency (GEEIA); emergency actions officer and HQUSAFE primary alerting project engineer, command pilot, USAF.
- GOODEN, REGINALD H., JR. (1970)**.....Political Science
B.A., University of California, Los Angeles, 1962; M.A., University of California, Santa Barbara, 1969; Ph.D., 1972.
Experience: Research assistant, teaching associate, University of California, Santa Barbara.

- GORDON, RAYMOND G. (1967)**.....Mechanical Engineering
B.S., Western New England College, 1966; M.S., University of Michigan, 1967.
Experience: Design engineer, Universal Design, Inc.; draftsman, Duchess Design and Development, Oriole Engineering Company, Combustion Engineering; laboratory assistant, Western New England College.
- GORDON, ROBERT L. (1967)**.....Ornamental Horticulture
Kent State University, Kent, Ohio; Graduate, American Floral Art School, Chicago, Illinois.
Experience: Science librarian, Kent State University; designer, Airport Florist, Akron, Ohio; owner, Gordon's Floral Art, Shop, Akron; designer-manager, Collin's West Towne Florist and Tauer's Flowers, Akron; assistant director, American Floral Art School, Chicago, Illinois.
- GOWGANI, GEORGE G. (1970)**.....Crop Science
B.S., California State Polytechnic College, San Luis Obispo, 1964; M.A., 1968; M.S., University of Nevada, 1972.
Experience: Director, Agricultural Chemicals, Central Organization of Iranian Farmers Cooperative. Research technician, U.C. Davis; research fellow, University of Nevada.
- GRADY, DAVID V. (1971)**.....Biological Sciences
A.B., University of California, Los Angeles, 1964; graduate study, University of California, Los Angeles.
Experience: Laboratory assistant, teaching assistant, research assistant, University of California at Los Angeles; lecturer, Mt. St. Mary's College.
- GRAHAM, PRISCILLA M. (1973)**.....Library
B.S., California Polytechnic State University, 1971; M.A.L., California State University, San Jose, 1973.
- GRAN, RUTH (1957)**.....Supervising Nurse
R.N., Mary's Help Hospital, San Francisco, 1936.
Experience: San Mateo Clinic; Army Nurse Corps; San Luis Obispo General Hospital.
- GRANT, DAVID M. (1950)**.....English
B.A., Iowa State Teachers College, 1935; M.A., University of Iowa, 1940; Ph.D., Stanford University, 1953.
Experience: Instructor in public schools in Iowa; chairman, Department of Speech, Hastings College, Hastings, Nebraska; officer, U.S. Navy; instructor, Stanford University.
- GRANT, DONALD P. (1967)**.....Architecture
B. Arch., University of Oklahoma, 1961; M. Arch., University of Utah, 1964; additional graduate study, University of California, Berkeley.
Experience: Construction and architectural firms in Utah; Moore Simpson and Partners, London; Ulrich Franzen; Raymond and Rado; Victor Lundy. Registered architect, New York and California.
- GRAVES, R. L., JR. (1951-54) (1957)**.....Architecture
B.S., Architecture, University of Kansas, 1948; M. Arch. and Urban Design, Cranbrook Academy of Art, 1950.
Experience: Associate Professor, Auburn University; assistant professor, University of Florida; instructor, Washington State University; private practice, Kansas City; architectural designer-draftsman with architectural firms in North Carolina, Michigan, California; U.S. Naval Construction Battalion. Registered architect, Kansas.
- GRAVES, THEODORE G. (1947)**.....Engineering Technology
B.A., Humboldt State College, 1940; M.S., Oregon State College, 1957.
Experience: Instructor, Paia School, Paia, Maui, Hawaii; instructor, Maui High School, Maui, Hawaii; teacher, San Francisco, California; lecturer, University of California, Santa Barbara College.

Faculty and Staff

- GRAYSON, RANDOLPH L. (1972)**..... Biological Sciences
B.A., State University of Iowa, 1958; M.A., Washington University, 1963; Ph.D., Michigan State University, 1972.
Experience: Teacher, Detroit Board of Education; Wayne County Community College, Detroit, Michigan.
- GREEN, WILFRED M. (1966)**..... English
B.S., Drake University, 1951; M.A., California State Polytechnic College, 1965; additional graduate study, University of California and University of Illinois.
Experience: Instructor, Bering Institute, Adak, Alaska, Fresno Adult School, Allan Hancock College, San Luis Obispo Adult School; teacher, Hartley High School, Stanwood Consolidated School, Iowa, Fresno High School, Orcutt School; contractor.
- GREFFENIUS, R. J. (1969)**..... Natural Resources Management
B.S., Colorado State University, 1932; M.F., University of Michigan, 1933; Ph.D., University of Michigan, 1968.
Experience: District ranger, range analyst, staff officer, U.S. Forest Service, South Dakota, Colorado.
- GRIFFIN, JAMES B. (1971)**..... Economics
B.A., University of Illinois, 1956; M.A., Wayne State University, 1963; Ph.D., 1968.
Experience: Lt. Col., USAF; graduate teaching assistant, Wayne State University; assistant professor, Chico State College.
- GRIFFIN, LESLIE J. (1971)**..... Program Counselor
B.A., University of Montana, 1967; M.A., California Polytechnic State University, 1971.
Experience: Youth director, Y.W.C.A.; student activities graduate assistant, California Polytechnic State University, San Luis Obispo.
- GRINNELL, ROBIN R. (1967)**..... Agricultural Engineering
B.S., Purdue University, 1955; M.S., University of Minnesota, 1961; additional graduate study, University of Illinois.
Experience: Research assistant, Iowa State University, Purdue University, University of Illinois; research and teaching assistant, University of Minnesota; student engineer, John Deere Waterloo Tractor Works; assistant professor, University of Guelph, Ontario, Canada; U.S. Army QM and Signal Corps.
- GRISWOLD DEL CASTILLO, RICHARD (1972)**..... History
B.A., University of California, Los Angeles, 1968; M.A., 1969.
Experience: Instructor, University of California, Santa Barbara, California State College, Los Angeles, Pepperdine University, Los Angeles Trade Technical College; teaching assistant and research assistant, University of California, Los Angeles.
- GROSZ, DAVID W. (1967)**..... Men's Physical Education
B.S., University of Oregon, 1960; M.S., 1965.
Experience: Professional football player, Saskatchewan, Edmonton, Montreal, Oregon; high school biology instructor, Oregon; substitute teacher, Washington; high school physical education instructor and football coach, Hoquiam, Washington; director, summer program, Hoquiam Park Board.
- GROVES, JOHN E. (1968)**..... Computer Science & Statistics
B.A., Pasadena College, 1963; M.A., University of California, Riverside, 1965; Ph.D., Kansas State University, 1972.
Experience: Teaching assistant, University of California, Riverside; assistant professor, Pasadena College.
- HADLEY, ROBERT E. (1967)**..... Animal Science
B.S., California State Polytechnic College, 1955.
Experience: U.S. Army; show horse trainer, Southern California; stallion manager, Shamel Ranch, Murrieta; large animal veterinary assistant, Murrieta; artificial insemination technician-distributor, dairy and beef cattle, Oakdale.

HAFEMEISTER, DAVID W. (1969)..... Physics
B.S., Northwestern University, 1957; M.S., University of Illinois, 1960; Ph.D., 1964.

Experience: Mechanical engineer, Argonne National Laboratory; teaching and research assistant, University of Illinois; post doctoral fellow, Los Alamos Scientific Laboratory; assistant professor, Carnegie-Mellon University.

HAGGARD, KENNETH L. (1967)..... Architecture
B.S., Texas A & M, 1958; B. Arch., North Carolina State University, 1963; M. Arch., University of Pennsylvania, 1967.

Experience: Principal planner, Department of Planning and Renewal, Camden, New Jersey; designer, Pancoast, Ferindino, Grafton and Skeels, Miami; instructor, University of Miami; designer, City Planning & Architectural Associates, North Carolina; research scientist, Radio Biological Laboratory, Balcones Research Center; U. S. Army; tool engineer, Boeing Aircraft. Registered architect, Florida.

HALE, THOMAS E. (1966)..... Mathematics
B.S., Indiana State University, 1960; M.S., 1963; M.S., St. Louis University, 1967; Ph.D., 1972.

Experience: Teacher, Vigo County School Corporation, Terre Haute, Indiana.

HALL, LLOYD A. (1966)..... Medical Officer
B.A., Stanford University, 1947; M.D., 1952.

Experience: Internship, San Francisco City and County Hospital; residency, Monterey County Hospital; postgraduate training, anesthesia, Cook County Hospital, Chicago; private practice, Fort Bragg, California; college physician, Fresno State College.

HALL, MICHAEL C. (1967)..... Animal Science
B.S., California State Polytechnic College—Kellogg, 1965; M.S., Kansas State University, 1967.

Experience: Graduate research assistant; general farming.

HALL, RICHARD E. (1946)..... Engineering Technology
B.S., California State Polytechnic College, 1952.

Experience: Aircraft mechanic, Lockheed Aircraft, and Hancock Field, Santa Maria; engine mechanic and supervisor, McClellan Air Field.

HALLETT, JAMES T. (1967)..... Crop Science
B.A., San Francisco State College, 1959; additional study, California State Polytechnic College.

Experience: Research biologist, Stauffer Chemical Company; field research agronomist, U.S. Borax Research Corporation and Germain's Inc.

HANKS, CHARLES J. (1954)..... Head, Mathematics Department
B.S., Pennsylvania State Teachers College at Shippensburg, 1942; M.A., University of Pennsylvania, 1949; Ed.D., University of Arkansas, 1954.

Experience: Assistant professor, Drexel Institute of Technology; assistant football coach, University of Arkansas; officer, U.S. Coast Guard.

HANNA, MAURICE (1970)..... Philosophy
B.A., American University of Beirut, 1957; M.A., University of Southern California, 1967; Ph.D., 1969.

Experience: Lecturer, University of Southern California.

HANNULA, REINO (1962)..... Computer Science & Statistics
B.A., University of California, Los Angeles, 1960; M.A., 1965; additional graduate study, Institute of Computer Science, University of London, Tulane University, University of Massachusetts.

Experience: Manager, grocery, Santa Monica; self-employed, Los Angeles; teacher, Redondo Beach High School.

HANSEN, PHYLLIS JEAN (1963)..... Library
A.B., University of Illinois, 1960; M.S.L.S., 1961.

Experience: Student assistant, University of Illinois Library; librarian, Queens Borough Public Library; reference librarian, Community Library, San Leandro, California.

Faculty and Staff

- HARDEN, F. SHELDON (1948)** Men's Physical Education
B.A., Santa Clara, 1943; M.A., College of the Pacific, 1950.
Experience: Player-coach, Sacramento Nuggets professional football team; playground supervisor, City of Sacramento; Red Cross swimming instructor, San Luis Obispo High School; officer, U.S. Army.
- HARIRI, MAHMUD S. (1971)** Head, Social Sciences Department
B.S., Hobart College, 1948; M.A., Columbia University Teachers College, 1953; Ph.D., New School for Social Research, 1968.
Experience: U.S. Department of State; assistant professor of educational sociology, American University of Beirut; U.S. Information Agency; U.S. Mission to Iran; head of department of social studies, Beirut College for Women; principal of Broadview School, Saskatchewan; instructor, Evening Division, Monterey Peninsula College; professor and head of department of humanities and pedagogy, Monterey Institute of Foreign Studies; dean and registrar, Monterey Institute of Foreign Studies.
- HARPER, RICHARD R. (1968)** Director of Athletics
B.S., University of California, Los Angeles, 1959; M.S., 1960.
Experience: Assistant freshman coach, UCLA; head football coach, Riverside City College; line coach, Colorado State University, University of California at Santa Barbara, University of Colorado.
- HARR, BERDY V. (1970)** Men's Physical Education
B.A., California State University, Long Beach, 1958; M.S., Chapman College, 1972.
Experience: U.S. Army; teacher/coach, Lynwood Unified School District.
- HARRIGAN, JOHN E., JR. (1969)** Architecture
B.A., University of California, Berkeley, 1959; M.A., San Jose State College, 1962; Ph.D., Colorado State University, 1966.
Experience: Engineering psychologist, Naval Electronics Lab, San Diego; assistant professor, Washington State University; teaching assistant, Colorado State University; supervisor and human factors engineer, Chrysler Corporation; supervisor, human factors research, Martin Company; instructor, Loyola University; engineer, Lockheed Space and Missile Corporation.
- HARRIS, MARY ELIZABETH (1969)** Library
B.S., San Diego State College, 1950; B.A., University of Oklahoma, 1952; M.S. in Library Science, University of Southern California, 1957.
Experience: Assistant librarian, Southwestern Medical School, University of Southern California; cataloger, U.S. Army Dependents' Education Group, Germany and California Western University; serials librarian, Lafayette College, Wisconsin State University.
- HARRIS, ROY M. (1954)** Animal Science
B.S., Utah State Agricultural College, 1952; M.S., 1954; Ph.D., 1970.
Experience: Butcher, Swift and Co., Ogden, Utah; breeding herdsman, Suncrest Hereford Ranch, Springerville, Arizona; Gibbs Quarter Horse and Hereford Ranch, Mackay, Idaho; livestock husbandman, Utah State University farm, Logan, Utah; U.S. Army.
- HARROW, DAVID R. (1970)** Social Sciences
A.B., Chico State College, 1960; M.A., 1968; additional graduate study, University of Oklahoma.
Experience: Instructor and department chairman, Chico Junior High School; instructor, Chico State College and Oklahoma Christian College, Oklahoma City; assistant professor, Appalachian State University, Boone, North Carolina.
- HASKELL, CHARLES THOMSON (1963)** Mathematics
B.A., University of Washington, 1946; M.S., University of Arizona, 1961; Ph.D., 1965.
Experience: Teacher, Fallon, Nevada, High School; trust clerk, Peoples National Bank of Washington; trust clerk, assistant trust officer, First National Bank of Nevada; graduate assistant, University of Arizona.

- HASSLEIN, GEORGE J. (1949)**.....Dean, School of Architecture and Environmental Design
B. of Arch., University of Southern California, 1945.
Experience: Road and bridge design in Mexico and Central America for Pan-American Highway; airport design for Army Engineers; development work at M.I.T. for Gilfillan Bros.; with architects and practice in Los Angeles area; designer for Summer Spaulding and Wurdeman and Becket; chief designer, Kistner, Curtis and Wright. Registered architect, California. NCARB Certificate; F.A.I.A.
- HAUSER, RAYMOND J. (1969)**.....Architecture
B.S.A.E., Northrop Institute of Technology, 1955; M.Ed., Chapman College, 1969; additional graduate study, Albright Art School, USAFI, University of Buffalo, New York State University, University of Alabama, Santa Ana College, University of California, Santa Barbara.
Experience: Officer, instructor and jumpmaster, U.S. Army; operations engineer and project engineer, Cornell Aeronautical Laboratory, New York; senior research engineer, Lockheed Missiles and Space Company, Huntsville, Alabama; managing engineer, Impulse Base Flow Facility, Northrop Space Laboratories; senior research engineer, Atlantic Research Corporation.
- HAWES, MICHAEL (1968)**.....Electronic and Electrical Engineering
B.Engr., University College, Dublin, Ireland, 1958; M.S., Ohio State University, Dayton, Ohio, 1967.
Experience: Demonstrator, University College, Dublin, Ireland; Electricity Supply Board, Ireland; instructor, Villanova University, Pennsylvania; research engineer, Wright-Patterson Air Force Base, Dayton, Ohio.
- HAWLEY, LEWIS B. (1969)**.....Chemistry
B.S., University of North Carolina, 1962; Ph.D., University of Georgia, 1966.
Experience: Teaching and research assistant, University of North Carolina; N.A.S.A. fellow, University of Georgia; research associate, Indiana University, University of California at Berkeley; instructor, University of California.
- HAYES, JAMES H. (1969)**.....Journalism
B.A., San Jose State College, 1950; M.A., University of Florida, 1966; additional graduate study, University of Minnesota.
Experience: Instructor and administrative assistant, College of Liberal Arts, University of Minnesota; assistant professor, University of Arizona; visiting lecturer, American University in Cairo, Egypt; freelance writer; copyreader, city editor, reporter, various newspapers in California and Arizona; part-time correspondent, West Coast Edition, Wall Street Journal.
- HAZEBROOK, HARRY (1968)**.....Electronic and Electrical Engineering
B.S., Michigan College of Mining and Technology, 1949; M.S., University of Wisconsin, 1951.
Experience: Chief systems engineer, Navigation Computer Corporation; engineering manager, Electro-Mechanical Research, Inc.; engineer, General Electric Company, Convair, Jansky and Bailey; instructor, University of Wisconsin.
- HEAD, DWAYNE G. (1966)**.....Men's Physical Education
B.S., Jamestown College, 1958; M.S., South Dakota State University, 1963; Ed.D., University of Oregon, 1967.
Experience: Instructor, West Fargo High School, South Dakota State University, University of North Dakota; teaching assistant, University of Oregon.
- HEALEY, JOHN R. (1947)**.....Head, Journalism Department
B.A., San Jose State College, 1941; M.S., University of California at Los Angeles, 1964.
Experience: Reporter, San Jose News; public relations, McClellan Field, Sacramento; reporter, Sacramento Union; Valley editor, Modesto Bee.
- HEATON, RICHARD (1970)**.....Men's Physical Education
B.A., Iowa State Teachers College, 1960; M.A., California State Polytechnic College, San Luis Obispo, 1969.
Experience: Manager, Peterson Sales & Service, Waterloo, Iowa; part-owner, Heaton Sage Rambler, Waterloo; owner-manager, Heaton Enterprises, Cedar Falls, Iowa; supervisor of recreation, California Men's Colony.

Faculty and Staff

HEINZ, JOHN A. (1953).....Director, Audio-Visual Services and Production
B.A., University of Washington, 1950; M.A., Ohio State University, 1964.
Experience: Technical and research assistant, University of Washington; production assistant, Korry Film Productions; free lance photographer, Seattle; production co-ordinator, Criterion Films, Inc., Seattle; film editor, KRON-TV, San Francisco.

HELMAN, ANATOL (1957).....Architecture
B.S., Warsaw Polytechnic Institute, 1934.
Experience: Designer, Associated Architects and Planners, Dallas, Tex.; The Anglo-Iranian Oil Co., Abadan, Iran; master-planner, International Technical Associates (ITA); Architects-Planners, Milan, Italy; architect, T. B. Bourne Associates, Washington, D.C. and Tokyo, Japan; Tecnicos Expanoles Asociados, Madrid, Spain; Warsaw Municipality; instructor, University of Nebraska; University of Oklahoma; Navy Orientation School. Visiting Fulbright professor in Architecture, University of Guayaquil and Central University, Ecuador.

HENDEL, FRANK J. (1967).....Aeronautical Engineering
B.S., Polytechnika Lwowska, Poland, 1935; M.S., 1937; Ph.D., 1941.
Experience: Consultant and technical specialist, North American Aviation; technical staff, Jet Propulsion Laboratory; engineer, Aerojet General Corp., Wigton-Abbott Corp., Anglo-American Oil Co., Foster-Wheeler, Ltd., Iraq Petroleum Co.; instructor, Polytechnika Lwowska.

HENDRICKS, FRANCIS (1969).....Architecture
A.B., University of California, Berkeley, 1950; M.City & Regional Planning, 1953.
Experience: Associate research professor, University of Pittsburg; lecturer, Stanford University; partner, Planning Research Associates, San Francisco; senior consultant, Arthur D. Little, Inc., Cambridge, Massachusetts; principal, Francis Hendricks & Assoc.; principal planner, 12th Naval District, U.S. Navy; private planning consultant, California; planner, City of Sausalito.

HENDRICKS, WILLIAM L. (1971).....Aeronautical Engineering
B.S., University of Kansas, 1966; Ph.D., 1971.
Experience: Teacher, high school, Tyler, Texas; teaching assistant, University of Texas; design engineer, Lockheed, Georgia; NASA/ASEE summer fellowship research program, Marshall Space Flight Center.

HENDRIKS, HAROLD J. (1952).....Electronic and Electrical Engineering
B.S., Iowa State University, 1940; M.S., 1941; additional graduate study, University of Colorado, 1949.
Experience: Engineer, Collins Radio Co., Cedar Rapids, Iowa; engineer, U.S. Naval Ordnance Test Station, China Lake; industrial experience program, Westinghouse Electric Corp., East Pittsburgh, Pennsylvania; engineer, Radio Corporation of America, Camden, New Jersey; engineer, Burroughs Corp., ElectroData Division, Pasadena; faculty associate, The Boeing Company, Seattle, Washington; associate professor, electrical engineering, University of Nevada, Reno, Nevada.

HENNIG, LLOYD R. (1963).....Medical Officer
B.S., University of California, 1927; M.D., 1932.
Experience: Internship, San Francisco General Hospital; residency, Franklin Hospital, San Francisco; U.S. Army; private practice, Willows.

HENSEL, DONALD W. (1960).....History
B.S., University of North Dakota, 1949; M.A., University of Colorado, 1953; Ph.D., 1957.

Experience: Instructor, public schools in Colorado, New Mexico, Arizona; graduate assistant, University of Colorado, Boulder; instructor in history and coordinator of Arts and Sciences instruction, University of Colorado, Denver; head, Social Sciences Department, Associate Dean, Academic Planning, California State Polytechnic College.

- HERALD, CHARLES A. (1958)**.....Electronic and Electrical Engineering
B.Sc., M.Sc., Dalhousie University, Halifax, Nova Scotia, 1935.
Experience: Assistant professor, University of Massachusetts; instructor, Pennsylvania State University; instructor, Communication School, Canadian Department of National Defense; lecturer, McGill University; lecturer, University of British Columbia; special gauge examiner, assistant and junior physicist, National Research Council, Ottawa.
- HESCH, EARL R. (1956)**.....Engineering Technology
B.S., University of New Mexico, 1955; M.S., Oklahoma A. & M. College, 1956.
Experience: U.S. Army; draftsman, Los Alamos Scientific Laboratory; survey party chief, C. H. Cole; surveyor-draftsman, City of Albuquerque.
- HICKS, WILLIAM R. (1957)**.....Men's Physical Education
B.S., University of California, Los Angeles, 1950; M.A., Long Beach State College, 1959.
Experience: United States Army; teacher, Long Beach City Schools.
- HINKLE, THOMAS L. (1972)**.....Men's Physical Education
B.S., California State Polytechnic University, 1966.
Experience: Teacher and coach, Mt. San Antonio Junior College, Lynwood High School, Bishop Amat High School.
- HITCHCOCK, VAUGHAN D. (1962)**.....Men's Physical Education
B.S., Washington State University, 1956; M.A., San Francisco State, 1965.
Experience: Physical education instructor, football and wrestling coach, Castro Valley High School; physical education instructor, football and wrestling coach, Hayward High School; teacher, Juvenile Hall, Alameda County Special Schools; playground, swimming and recreation director, Hayward Area Recreation Department, Hayward.
- HOFFMAN, GEORGE E. (1956)**.....Industrial Engineering
B.S., Carnegie Institute of Technology, 1951; B.S., California State Polytechnic College, 1962; M.B.A., University of Southern California, 1959; M.S., Stanford University, 1960; additional graduate study, Oregon State University.
Experience: Time and methods engineer, Robertshaw Fulton Controls; Kennecott Copper Corporation, Ray, Arizona. Registered professional engineer, California.
- HOFFMANN, JON A. (1968)**.....Aeronautical Engineering
B.S., University of Wisconsin, 1964; M.S., 1966; additional graduate study, Wisconsin State University.
Experience: Draftsman, Marathon Electric, Wausau, Wisconsin; engineer, Chemstrand Corporation, Pensacola, Florida; research engineer, Caterpillar Tractor, Peoria, Illinois; instructor, University of Wisconsin; research engineer, Trane Company, LaCrosse, Wisconsin.
- HOLLAND, V. L. (1972)**.....Biological Sciences
A.A., Taft Junior College, 1964; B.A., Fresno State College, 1966; M.A., 1969; additional graduate study, University of California, Berkeley.
Experience: Teaching assistant, Fresno State College, research assistant, teaching assistant, University of California, Berkeley.
- HOLLEY, F. JERALD (1961)**.....Director, Admissions, Records and Evaluations
B.S., Utah State University, 1961; M.A., California State Polytechnic College, 1968.
Experience: U.S. Air Force; private business, Rexburg, Idaho.
- HOLT, DONALD N. (1970)**.....Journalism
B.A., University of Colorado, 1950; M.S., University of Wisconsin, 1970.
Experience: Advertising staff, Greeley, Colorado Tribune; Visalia, California Times-Delta; public information, head, agricultural information, director, photographic services, University of California, Davis; agricultural editor, Colorado State University; instructor, Wisconsin State University.

Faculty and Staff

- HOLT, RAY J. (1955)** Physics
 A.B., University of California, 1939; M.A., 1949.
 Experience: Physicist, University of California Radiation Laboratory; aircraft inspector, Consolidated Vultee Aircraft Corporation; high school and junior college teacher.
- HOLTZ, WALTER E. (1954-66) (1968)** Head,
 Environmental Engineering Department
 B.S., Illinois Institute of Technology, 1949; M.S., California Institute of Technology, 1953; M.S., University of Washington, 1964.
 Experience: Professor, California State Polytechnic College, Pomona; project engineer, Baker Engineering Corp.; engineer, Carrier Corp.; engineer, U.S. Naval Air Missile Test Center; U.S. Air Force; consultant, USAID. Registered professional engineer, California.
- HOMAN, DENNIS N. (1966)** Biological Sciences
 B.A., University of Iowa, 1955; M.S., 1958; Ph.D., 1960.
 Experience: Instructor, University of Iowa; assistant professor, Illinois State University; associate professor, Wisconsin State University.
- HOMFELD, GILBERT L. (1960)** Mathematics
 A.B., Santa Barbara State College, 1936; M.A., California State Polytechnic College, 1960.
 Experience: Tulare County Schools Office, teaching; school building draftsman and inspector; engineering draftsman, Southern California Gas Company, Visalia; ranching in Visalia; teaching, Selma Junior High School, Fresno County.
- HONEGGER, HARRY H. (1961)** Metallurgical Engineering
 B.S.M.E., Oregon State College, 1950; M.S.M.E., 1952.
 Experience: Welder, Oregon Shipyards; U.S. Army; laboratory supervisor, Metallurgical Engineers, Inc.; registered professional engineer, Oregon. Registered professional engineer, California.
- HOOKS, ROBERT D. (1966)** Animal Science
 B.S., California State Polytechnic College, 1961; M.S., Iowa State University, 1964; Ph.D., 1966.
 Experience: Swine herdsman, State College of Washington, Pullman, Washington; manager and part-owner, orchard and swine farming enterprise, Orland, California; U.S. Marine Corps.
- HOOVER, ROBERT L. (1970)** Social Sciences
 A.B., University of California, Berkeley, 1965; M.A., 1969; Ph.D., 1971; additional graduate study, University of California, Berkeley, Stanford University.
 Experience: University of California Archaeological Survey, Berkeley; graduate assistant, University of California, Berkeley; instructor, Merritt College, Oakland; visiting professor, Stanford University; midshipman, U.S. Navy; editor, San Luis Obispo County Archaeological Society.
- HORTON, WILLIAM F. (1968)** Electronic and Electrical Engineering
 B.S., California Institute of Technology, 1946; M.S., 1948; Ph.D., UCLA, 1966.
 Experience: Department head, senior staff engineer, Hughes Aircraft Company; design specialist, section head, Lear Siegler, Inc.; engineer, Westinghouse Electric; research engineer, associate in engineering, UCLA.
- HOSTETTER, H. CLYDE (1958)** Audio-Visual
 B.J., University of Missouri, 1949; graduate study, University of Missouri, University of Southern California, American University, Arizona State University.
 Experience: Officer, U.S. Navy; public relations director, Kansas Industrial Development Commission; public relations director, United States Junior Chamber of Commerce; public relations consultant, Hughes Aircraft Company; associate editor, Farm Journal, Inc., Washington, D.C.; free-lance multi-media producer.
- HOULIS, JEROME F. (1959)** Chemistry
 B.S., California State Polytechnic College, 1958; graduate study, California State Polytechnic College.
 Experience: Electronics maintenance, U.S. Air Force.

- HOUSTON, ERNEST R. (1957)**..... Ornamental Horticulture
B.S., Oklahoma State University, 1943; M.S., Ohio State University, 1947; additional graduate study, Oklahoma State University.
Experience: Assistant professor, Oklahoma State University; manager of plant shipments, Furrow and Co., Guthrie, Oklahoma; grower and consultant, Higdon Flower Shop and Nursery, Oklahoma City, Oklahoma; U.S. Army.
- HOWARD, LORRAINE H. (1964)**..... Associate Dean, Women
B.S., Oregon State College, 1945; Ed.M., Oregon State University, 1961; Ph.D., 1964.
Experience: Assistant buyer, Meier & Frank Co., Portland; assistant chemist, Hawley Pulp and Paper, Oregon City; assistant to director, Fruit & Flower Day Nursery, Portland; teacher, Oregon State University.
- HOYT, HOMER E. (1969)**..... Education
Ed.B., Rhode Island College of Education, 1940; M.A., University of California, Berkeley, 1956.
Experience: Executive director, Northern San Joaquin Valley Counties Supplementary Education Center; district superintendent, Healdsburg High School and Elementary School Districts; assistant superintendent, instructional services, San Luis Obispo County Schools; elementary and junior high school principal, San Rafael City Schools.
- HSIEH, CARL C. F. (1970)**..... Architecture
B.S., National Taiwan University, 1961; M.S., So. Dakota School of Mines and Technology, 1965; Ph.D., Northwestern University, 1968.
Experience: Engineering officer, ROTC Nationalist Chinese Airforce, Taiwan; structural engineer, Taiwan Public Works; research fellow, South Dakota School of Mines and Technology; research assistant, Northwestern University; body research engineer in computer-aided design and advance development group, Chrysler Corporation, Michigan.
- HSU, JOHN Y. S. (1970)**..... Computer Science and Statistics
B.S., National Taiwan University, 1959; M.S., University of California, Berkeley, 1964; Ph.D., 1969.
Experience: Research engineer, Broadcasting Corporation of China; teaching fellow, research assistant and reader, University of California, Berkeley; research engineer, Gertea Product; project engineer, Librascope, Fairchild Core Memory; computer architect, Varian Data Machines.
- HUEHN, KEMPTON L. (1968)**..... Mathematics
B.S., Iowa State University, 1957; M.S., 1962; additional graduate study, Iowa State University, Colorado School of Mines.
Experience: Member technical staff, T.R.W. Systems Group; instructor, Iowa State University. Colorado School of Mines.
- HUFF, EARL D. (1970)**..... Political Science
B.A., San Francisco State College, 1959; M.A., University of Idaho, 1969; Ph.D., 1971.
Experience: Instructor, Solano College, Vallejo, California; chairman, Social Studies Department, Solano Junior High School, Vallejo; Fulbright exchange teacher, England; NSF fellow, University of Idaho; Fulbright fellow, American University of Beirut, Lebanon.
- HUGHES, LUTHER B., JR. (1971)**..... Soil Science
B.S., Western Kentucky University, 1966; M.S., Purdue University, 1970; Ph.D., 1971.
Experience: Soil conservationist, U.S.D.A. Soil Conservation Service, Lexington, Kentucky; graduate research and teaching assistant, Purdue University.
- HUOT, ROBERT J. (1963)**..... English
B.A., University of Washington, 1946; M.A., 1951; Ph.D., University of Utah, 1971; additional graduate study.
Experience: Salesman and sales instructor, A. S. Aloe Surgical Supply Company; teaching fellow, University of Washington; instructor, Tulane University; associate, University of Washington; instructor, Montana State College; graduate assistant, University of Utah.

Faculty and Staff

- HUTCHINSON, JAMES (1971)**.....Graphic Communications
B.F.A., Carnegie Institute of Technology, 1955; B.S., 1959.
Experience: Vice president, advertising art and production, The Albert Woodley Co., Inc.; senior media planner, Young and Rubicam, Inc.
- HUTCHISON, L. V. (1972)**.....Psychology
B.A., California State University, Los Angeles, 1968; M.A., University of Portland, 1972; Ph.D., University of Portland, 1972.
Experience: Management consultant associate, Industrial Consultants, Inc., Los Angeles; graduate fellow, National Science Foundation, University of Portland; instructor and statistical methods research associate, Physiological Psychology Laboratory, Portland State University; behavioral science consultant, Division of Human Resources, State of Oregon.
- HUTTON, REX L. (1966)**.....Mathematics
B.S., Baldwin Wallace College, 1959; M.S.T., Illinois Institute of Technology, 1964; Ed.D., Arizona State University, 1972.
Experience: Teacher, Brooklyn Junior High School; research assistant, Education Research Council of Greater Cleveland; instructor, Cuyahoga Community College.
- HYER, EDGAR A. (1951)**.....Head, Agricultural Management Department
B.S., Utah State College, 1939; M.S., 1942; Ph.D., Cornell University, 1948.
Experience: Land use economist, Utah; field supervisor of A.A.A., Utah; U.S. Army; graduate assistant, Cornell University; assistant professor of agricultural economics, Oregon State College.
- HYNES, C. DENNIS (1957)**.....Biological Sciences
B.A., Macalester College, 1951; M.S., University of Michigan, 1953; Ph.D., University of Florida, 1957.
Experience: Museum assistant, University of Michigan; teaching assistant and research assistant, University of Florida.
- IKENOYAMA, GEORGE K. (1964)**.....Architecture
B.S., California State Polytechnic College, 1955; M.Arch., University of Hawaii, 1972.
Experience: Draftsman and associate, John Badgley; private practice, California; lecturer, California State Polytechnic College; visiting lecturer, University of Hawaii. Registered architect, California.
- IRVIN, MELVA (1968)**.....Women's Physical Education
A.B., Colorado State College, 1963; M.S., Pennsylvania State University, 1968.
Experience: Teacher, Righetti High School, Santa Maria; graduate assistant, instructor, Pennsylvania State University.
- ISACHSEN, OLAF F. (1971)**.....Business Administration
Commercial Letter, Treider's Commercial School, Oslo, Norway, 1955; B.Engr., Institute of Textiles, Boras, Sweden, 1956; M.B.A., Harvard School of Business, 1961; Ph.D., Michigan State University, 1970.
Experience: Assistant professor, Arcadia University, Nova Scotia; manager, Isco A.G., Zurich, Switzerland; export consultant, Isco A/S, Oslo, Norway; production manager, Udis A/S, Oslo, Norway.
- ISERMANN, ELEANOR (1970)**.....Library
B.A.E., University of New Mexico, 1956; M.A. in Librarianship, San Jose State College, 1970.
Experience: Teacher of primary grades and Art in California Elementary Schools.
- JACKS, MADGE A. (1964)**.....Medical Officer
M.D., Loyola University Medical School, Chicago.
Experience: Internship, Cook County Hospital, Chicago; residency, Municipal Contagious Disease Hospital, Chicago; residency, Illinois Research & Educational Hospital, Chicago; private practice, Chicago; St. Joseph's Hospital Laboratory, San Francisco; residency, San Luis Obispo General Hospital.

Faculty and Staff

- JACKSON, NORMAN L. (1969)** English
B.A., Arizona State University, 1963; M.A., Northern Arizona University, 1966.
Experience: Teacher. Adult Evening School, California's Men's Colony, Cuesta College, Chaffey High School.
- JACOBS, JAMES W. (1967)** Animal Science
B.S., Oklahoma State University, 1967.
Experience: Livestock showing, judging, and ranching operations.
- JAMES, AERNAT S. (1965)** Physics
B.S., University of Madras, 1956; M.A., Southern Illinois University, 1963.
Experience: Instructor, Orient Technical College, Frostburg State College; research assistant, Southern Illinois University; assistant, U.S. Embassy, Kabul, Afghanistan.
- JAMES, RUTH H. (1971)** Head, Home Economics Department
B.S., Iowa State University, 1943; M.A., California State College, Los Angeles, 1960; Ed.D., University of California, Los Angeles, 1968.
Experience: Teacher, Chowchilla Union High School and Carmel Unified Schools; home economist, Southern California Gas Company; lecturer, California State College, Los Angeles; counselor, School of Education, University of California, Los Angeles; instructor, California State College, Long Beach; assistant professor, San Fernando Valley State College.
- JAMESON, GLORIA (1967)** English
B.A., Texas Woman's University, 1941; M.A., Teacher's College, Columbia University, 1944; Ph.D., University of Texas, 1966.
Experience: Librarian, Galveston Public Schools; elementary teacher in Houston, San Antonio, Texas; Muskogee, Oklahoma; and Montgomery County, Maryland; consultant in education, Montana, and Christ Church, Alexandria, Virginia; professor of English, Ewha Woman's University, Seoul, Korea; research associate, linguistics, University of Texas; director, intensive English program, Vietnamese Leadership/Scholarship Program, California State Polytechnic College.
- JANEWAY, ROBERT K. (1972)** Engineering Technology
B.S., California State Polytechnic College, 1951; graduate study, University of California, Los Angeles, California Polytechnic State University.
Experience: Senior research engineer, Engineering Supervisor Autonetics Division, North American Aviation, Inc.; engineering manager, Montedoro Corp., San Luis Obispo.
- JENKINS, STARR (1961)** English
B.A., University of New Mexico, 1948; M.A., Stanford University, 1959; Ph.D., University of New Mexico, 1972.
Experience: Navy and Army; instructor, Albuquerque Public High Schools; laborer, firefighter, smokejumper and aerial observer with U. S. Forest Service, California, Oregon, Montana, and Idaho; national park ranger, Yosemite; information specialist (writer-photographer), U. S. Forest Service, Southwestern Regional Office, Albuquerque, New Mexico; free-lance writer-photographer.
- JENNINGS, CHARLES W. (1968)** Art
B.A., Wheaton College, 1966; M.A., M.F.A., Northern Illinois University, 1968.
Experience: Factory worker, IBM; graduate assistant, Northern Illinois University.
- JOHNSON, BOYD WALKER (1969)** Mathematics
B.S., United States Naval Academy, 1951; M.S., North Carolina State College, 1956; Ph.D., North Carolina State University, 1963.
Experience: Assistant professor, U.S. Air Force Academy and Florida Presbyterian College; Dean of Men, Florida Presbyterian College.

Faculty and Staff

JOHNSON, CORWIN M. (1961).....Head, Crops Science Department
B.S., State College of Washington, 1950; M.S., 1951; Ph.D., Cornell University, 1953.

Experience: Field and laboratory technician, research assistant, Department of Agronomy, State College of Washington; research assistant, Department of Agronomy, Cornell University; research agronomist, Northwestern Washington Experiment Station; assistant professor and agronomist, Mississippi State University.

JOHNSON, ERIC V. (1969).....Biological Sciences
B.A., Brown University, 1964; Ph.D., Cornell University, 1969.

Experience: Teaching and research assistant, assistant curator of birds, Cornell University.

JOHNSON, MEAD R. (1956).....English
B.A., University of Denver, 1939; M.A., 1949; additional graduate study, University of Denver.

Experience: Advertising manager, Sterling (Colorado) Farm Journal; U. S. Army; instructor in Colorado and California public schools; instructor, Colorado School of Mines; associate professor, Central Missouri State College.

JOHNSON, MILES B. (1957).....English
B.A., Gustavus Adolphus College, 1947; M.A., University of Minnesota, 1951; M.A., University of Denver, 1953; M.A., University of Iowa, 1966; additional graduate study, University of Washington, University of Southern California, University of Iowa.

Experience: Instructor and publications adviser, Florence State College; instructor and publications chairman, Memphis State University; instructor, University of Tennessee, Memphis; assistant professor, Luther College; instructor, University of Puget Sound; presidential assistant, Johnson Wholesale and Manufacturing Company; author.

JOHNSON, RICHARD F. (1950).....Head, Animal Science Department
B.S., Iowa State College, 1942; M.S., State College of Washington, 1947.

Experience: U.S. Army; instructor, College of Agriculture and assistant animal husbandman, Experiment Station, State College of Washington, Pullman, Washington.

JOHNSON, WILLIAM V. (1966).....Music
B.M.E., Indiana University, 1962; M.M., University of Michigan, 1966.

Experience: Instrumental music instructor, Seeger Memorial High School, Indiana; musical director, Light Opera Company, Illinois; assistant to conductor and member of band staff, University of Michigan.

JOHNSTON, ROBERT M. (1946-54) (1956).....Engineering Technology
B.A., Santa Barbara State College, 1937; graduate study, Boeing School of Aeronautics.

Experience: Meteorologist, Pan American Airways and Pennsylvania Central Airlines; meteorology instructor, Randolph Field and Pan American Airways; junior civil engineer, Division of Highways, California.

JOHNSTON, THOMAS V. (1967).....Architecture
Diploma of Teaching, Victoria University, New Zealand, 1948; Visual Arts Certificate, London University, 1950; D.A., Glasgow School of Art and Architecture, 1952.

Experience: Head, Department of Art, Palmerston North Teachers College, New Zealand; head, Department of Art, Waihi College, New Zealand; lecturer, Glasgow School of Art and Architecture; newspaper art critic; internationally represented sculptor.

JONES, ANDREW D. (1972).....Head, Transportation Engineering Department
B.S., University of Houston, 1953; M.S., University of Texas, 1965; Ph.D., Purdue University, 1972.

Experience: Graduate research instructor, Purdue University; district construction engineer, Texas Highway Department; lecturer, University of Texas; supervising planning engineer, Texas Highway Department; senior design engineer, Texas Highway Department. Registered professional engineer, Texas.

JONES, JACK B. (1969).....Education
B.A., University of California, Santa Barbara, 1957; M.A., 1965; Ed.D., University of Arizona, 1970.

Experience: Administrative officer, U.S. Army; sergeant, Santa Barbara Police Department; elementary teacher, Santa Barbara, Goleta; graduate assistant, University of Arizona; instructor, Ventura College.

JONES, RICHARD V. (1969).....Education
A.B., Fresno State College, 1949; M.A., 1952; Ed.D., University of California, Berkeley, 1958.

Experience: Teacher, Fresno City Schools; consultant in Field Service, research assistant, staff associate and Director of Research, extension teacher, University of California; principal, Petaluma Senior High School; superintendent, Oroville Union High School District; Director of Continuing Education and Placement Services, Chico State College.

JORGENSEN, EDWARD J. (1947).....Men's Physical Education
B.A., Chico State College, 1936; M.S., University of Southern California, 1950.

Experience: Instructor, physical education and industrial arts, South Fork, Ferndale, and Watsonville high schools; athletic director, Marin Junior College; officer, U.S. Navy.

JORGENSEN, NANCY ANN (1968).....Counselor
B.A., University of Hawaii, 1957; graduate study, Institute of Psychology, University of Paris, University of Hawaii, University of California, Santa Barbara.

Experience: Graduate assistant, University of Hawaii; psychometrist, California State Polytechnic College; senior psychometrist, University of California, Berkeley; junior assistant-research, U.C.L.A.; psychometrist and associate psychologist, San Luis Obispo County Community Mental Health Services.

JUDD, W. BOYD (1956).....Mathematics
B.S., St. Mary's College, 1939; M.A., University of California, 1951; D.Ed., the Pennsylvania State University, 1969.

Experience: High school teacher, California; instructor, Army specialized training program, University of Santa Clara; research mathematician, University of California; computer laboratory, in charge of statistical operations, Bureau of Research and Guidance, Office of Los Angeles County Superintendent of Schools; tabulator machine supervisor, State of California, Department of Public Health; participant in National Science Foundation Institute, New Mexico State University.

KABAT, HERBERT R. (1952).....Physics
B.S., United States Naval Academy, 1938; M.A., Stanford University, 1951; additional graduate study, University of Southern California, Stanford University, University of Colorado.

Experience: Officer, U. S. Navy; research analyst, Rheem Mfg. Co.; instructor, Pasadena City College, College of the Sequoias.

KANE, JOHN J. (1969).....Head, Mechanical Engineering Department
B.S., U.S. Naval Academy, 1951; M.S., University of Pittsburgh, 1959, Ph.D., 1961.

Experience: Adjunct Professor, University of Pittsburgh; engineer, Westinghouse Electric Corporation, Pittsburgh; lecturer, University of Southern California; member technical staff, Aerospace Corporation; self-employed, Sales Management; officer, U.S. Marine Corps.

KANN, DAVID J. (1969).....English
B.A., Brandeis University, 1964; M.A., New York University, 1966; Ph.D., Occidental College, 1971.

Experience: Teaching associate, Occidental College; instructor, Polytechnic School, Pasadena.

KASTNER, GEORGE W. (1970).....English
B.A., Fresno State College, 1965.

Experience: Teaching assistant, instructor, University of Washington.

Faculty and Staff

- KATEKARU, JAMES (1969)**.....Chemistry
B.S., University of Oregon, 1956; M.S., University of Arizona, 1961; Ph.D., University of Cincinnati, 1965.
Experience: Research assistant, University of Arizona; analytical chemist, Federal Food and Drug Administration; teaching assistant, University of Cincinnati; research chemist, North American Aviation; editor, Chemical Abstract Service; chemist, Naval Radiological Defense Laboratory.
- KAY, THOMAS D. (1958)**.....Engineering Technology
B.S., Wayne State University, 1957; M.A., California State Polytechnic College, 1967.
Experience: Assistant training director, Ex-Cello-O Corporation; apprentice instructor, Chrysler Corporation; radio team chief and refrigeration mechanic, U.S. Army; machinist, Detroit-Timken Axle Company; apprentice, Goodyear Tire and Rubber Company.
- KEECH, ROGER A. (1965)**.....Mechanical Engineering
B.S., California State Polytechnic College, 1955; M.S., University of Southern California, 1964.
Experience: Engineer, Menasco Manufacturing Co., Rocky Mt. Arsenal, Lockheed Aircraft; president, Dynalytic Engineering Co.; instructor, California State Polytechnic College, Pomona.
- KEEP, ROGER L. (1968)**.....Industrial Technology
B.S., Church College, 1957; M.S., Stout State University, 1968; Ed.D., Utah State University, 1972.
Experience: Building construction supervisor, Polynesian Cultural Center, Hawaii; foreman, Perkins Machine Company.
- KEETCH, BRENT H. (1967)**.....English
B.A., Utah State University, 1965; M.A., 1966; Ph.D., University of Utah, 1971.
Experience: Research aide, Utah State University Forestry Department, U.S. Forest Service; senior assistant, Utah State University; U.S. Army; staff writer, The Salt Lake Tribune; correspondent, newsman, The Associated Press, Utah, Arizona.
- KEIF, RODNEY G. (1960)**.....Environmental Engineering
B.S., Kansas State University, 1949; graduate study, California State Polytechnic College, Kansas State University.
Experience: Sales and application engineer, O'Connor-Oklahoma Company, Oklahoma City; registered professional engineer, Oklahoma; consultant, Naval Weapons Center, China Lake; private practice.
- KELLER, ELMO A., JR. (1963)**.....Computer Science and Statistics
B.A., Brigham Young University, 1959; M.A., 1961; Ph.D., Iowa State University, 1972.
Experience: National Science Foundation trainee, Iowa State University; instructor, Iowa State University; instructor, Church College of Hawaii; graduate teaching assistant, Brigham Young University.
- KELLERMAN, MARTIN (1968)**.....Chemistry
B.S., Polytechnic Institute of Brooklyn, 1953; Ph.D., University of Washington, 1966.
Experience: Research assistant, Polytechnic Institute of Brooklyn, University of Washington, University of California at San Diego; analytical chemist, Continental Baking Company.
- KELLEY, HELEN P. (1966)**.....Journalism
B.P.A., Brooks Institute of Photography, 1966; M.S., California State University, San Jose, 1971.
Experience: Free-lance writing and newspaper work, Arcadia and Preston, Kansas; free-lance photography and writing.

- KENNEDY, ROBERT E. (1940)** President
A.B., San Diego State College, 1938; M.A., Stanford University, 1950; Ph.D., Claremont Graduate School, 1966.
Experience: Editorial Staff, San Diego Sun, San Diego Daily Journal, San Luis Obispo Telegram-Tribune, Palo Alto Times; at California State Polytechnic College: Chairman, Journalism Department; Director of Public Relations; Assistant to the President; Dean, Arts and Sciences; Vice President.
- KENNELLY, BRUCE (1947)** Chemistry
B.S., University of Kentucky, 1944; M.S., Purdue University, 1946; Ph.D., Cornell University, 1952.
Experience: Chemist, department of agricultural chemistry, Purdue University; research chemist, department of biochemistry and nutrition, Cornell University.
- KENYON, PAUL (1957)** Business Administration
J.D., Southern Methodist University law school, 1949; M.A., California State Polytechnic College, 1959.
Experience: Insurance legal staff, investment counseling, methods analyst, and business systems and procedures analyst.
- KERR, JOHN F. (1967)** English
B.A., Arkansas State University, 1953; M.A., University of Michigan, 1956; Ph.D., University of Texas, 1964.
Experience: High school journalism and speech teacher, Missouri; assistant professor, Westminster College, Missouri; instructor, University of Missouri; teaching assistant, University of Texas; assistant professor, Louisiana State University.
- KERSTEN, TIMOTHY W. (1971)** Economics
B.A., Sacramento State College, 1968; M.A., University of Oregon, 1970; additional graduate study.
Experience: Radio announcer, KXRZ radio station; survey interviewer, State of California Department of Water Resources; graduate research assistant, State of California Coordinating Council for Higher Education.
- KIMBALL, KENNETH R. (1967)** Industrial Technology
B.E., University of Southern California, 1956; M.S., 1959; B.S., 1965; additional graduate study, Arizona State University.
Experience: Resident engineer and executive officer, Engineer District; member, War Department General Staff; chief of management branch, Major Air Command; air installation officer and wing staff engineer; member of technical staff and supervisor of Electronics Manufacturing, Hughes Aircraft; industrial engineer, chief of overhaul and repair, engineering group leader, Autonetics; manufacturing manager, California Steel and Tube; general manager, Climax Manufacturing; head, plant maintenance, and chief, industrial engineering, Rocketdyne; staff consultant, H. B. Maynard and Company. Registered professional engineer.
- KNABLE, ANTHONY E. (1973)** Natural Resources Management
B.A., Blackburn College, 1965; M.A., Southern Illinois University, 1967; Ph.D., 1972.
Experience: Graduate research assistant, Southern Illinois University; graduate teaching assistant, Southern Illinois University; natural resources planner, West Virginia Department of Natural Resources.
- KNAPP, ERNA BOWMAN (1962)** Art
M.F.A., Otis Art Institute, Los Angeles, 1961.
Experience: Instructing designer, Foremost Studio, New York City; Headon Designers, London and Manchester, England; owner and operator of commercial design studio, Montreal, Canada; freelance designer, Los Angeles; fine arts instructor, private schools, art associations, Los Angeles.
- KOBERG, DONALD J. (1962)** Architecture
B.Arch., Tulane University, 1958; M.Arch., University of Washington, 1970.
Experience: Architectural practice as designer and draftsman in New Orleans; instructor, North Dakota State College; lecturer, University of California at Berkeley; research associate, Architectural Prototypes, Berkeley; Corps of Engineers, U.S. Army. Registered architect, Louisiana.

Faculty and Staff

KOGAN, IRVIN J. (1957) Engineering Technology
B.A., Wayne University, 1954; M.A., Stanford University, 1955. Additional graduate study, Stanford University.

Experience: Instructor, Orange Coast College; U.S. Air Force.

KOMBRINK, RICHARD T. (1955) Engineering Technology
A.B., Loyola University, 1946; B.S.M.E., University of Southern California, 1964.

Experience: Pilot, U.S. Army Air Corps; draftsman, Hess Greiner, and Pollard; sales engineer, T. H. Creears Corp.; civil designer, City of Culver City; assistant project engineer, RCA Radar and Missile Division; consultant, South San Francisco Naval Shipyard. Registered technologist.

KORSMEYER, RUSSELL (1958) Electronic and Electrical Engineering
B.S.E.E., University of Missouri, 1950; M.S.E.E., University of Southern California, 1958.

Experience: Electrical engineer, Los Angeles Department of Water and Power; junior design engineer, North American Aviation, Inglewood; relay engineer, Gulf States Utilities, Beaumont, Texas. Registered professional engineer, California.

KOURAKIS, JOSEPH M. (1970) Architecture
B.A. Arch., University of Illinois, 1954; M.A. Arch., University of Illinois, 1957; M.A. CRP, University of California, Berkeley, 1961.

Experience: Self employed, Berkeley; project manager, Architect/planner, Wisler Patri, San Francisco; planning officer for physical planning, Redevelopment Agency, City of Oakland; senior architectural designer and urban planner, Wilsey, Ham & Blair, San Mateo; assistant planner, Oakland City Planning Department; military installations planner, 12th Naval District. Registered architect, California.

KRANZDORF, RICHARD B. (1971) Political Science
A.B., University of Pennsylvania, 1958; M.A., 1959; M.A., University of California, Los Angeles, 1966; additional graduate study, University of California, Los Angeles.

Experience: Teaching assistant, University of California, Los Angeles; news editor, WBZ-TV, Boston; lecturer, University of Nigeria, Nsukka.

KREJSA, RICHARD J. (1968) Biological Sciences
B.S., Michigan State College, 1954; M.A., University of California, Los Angeles, 1958; Ph.D., University of British Columbia, Vancouver, 1964.

Experience: Instructor and assistant professor, Western Washington State College, University of Hawaii, Columbia University.

KRETZMANN, ALFRED M. (1973) Economics
B.A., Northern Illinois University, 1966; M.A., 1967; additional graduate study, Colorado State University.

Experience: Teaching internship, Northern Illinois University; instructor, Central Michigan University; graduate teaching assistant, Colorado State University.

KRIEGER, DANIEL E. (1971) History
B.A., San Jose State College, 1965; Ph.D., University of California, Davis, 1973.

Experience: Associate in history, University of California, Davis; graduate teaching fellow, San Francisco State College.

KRUPP, WILLIAM E. (1969) Engineering Technology
B.S., University of California, Berkeley, 1942; M.S., Stanford University, 1955; additional graduate work, University of California, Santa Cruz.

Experience: Engineering Aid, Standard Oil Company of California; Captain, U.S. Army Corps of Engineers; construction, self-employed; test engineer, North American Aviation; staff engineer, Sandia Corporation, Albuquerque, New Mexico; engineer, North American Aviation, Santa Susana; engineer, Coleman Engineering Company, Hurricane, Utah; staff engineer, Lockheed Missile and Space Company, Santa Cruz and Sunnyvale; instructor Monterey Peninsula College, Monterey and Cabrillo College, Santa Cruz. Registered professional engineer, California.

KURTZ, WILLIAM B. (1971) Natural Resources Management
B.S., New Mexico State University, 1963; M.S., 1966; Ph.D., University of Arizona, 1971.

Experience: Range conservationist, Soil Conservation Service, U.S.D.A.; Graduate research assistant, New Mexico State University; Graduate research associate, University of Arizona; Project economist, Daniel, Mann, Johnson and Mendenhall; Senior economist, VTN—Orange County.

LABAR, GEORGE W. (1970) Biological Sciences
B.S., Wisconsin State University, 1964; M.S., Idaho State University, 1967; Ph.D., Montana State University, 1970.

Experience: Teacher, Crandon High School; graduate teaching assistant, Idaho State University; research assistant, Montana State University; lecturer, Fresno State College.

LABHARD, LEZLIE A. (1967) Home Economics
B.S., University of California, 1965; M.S., 1967.

Experience: Resident assistant, laboratory assistant, research assistant, University of California, Davis.

LAKE, ROBIN (1970) Speech Communication
B.A., University of British Columbia, 1964; graduate study, Stanford University.

Experience: Teaching assistant, Stanford University; director, actor, stage manager with various resident companies in Canada and the United States. Member, Actors' Equity.

LAMBERT, ROYCE L. (1969) Soil Science
B.S., Purdue University, 1964; M.S., 1966; Ph.D., 1969.

Experience: Farm operator; welder; warehouse manager, building products; graduate teaching and research assistant, Purdue University.

LAMOURIA, LLOYD H. (1965) Head, Agricultural Engineering Department
B.S., Michigan State University, 1949; M.S., Iowa State University, 1950.

Experience: U.S. Air Force; instructor, Iowa State University; associate professor and associate agricultural engineer, University of California; manager of product planning, J. I. Case Company, Racine, Wisconsin.

LANDRETH, JAMES R. (1956) Director, Business Affairs
B.A., Mexico City College, 1954; M.B.A., Stanford University, 1956; additional graduate study, Claremont University College.

Experience: Instructor, U.S. Army; explosive ordnance disposal, U.S. Army; college personnel officer, assistant to dean of the college, California State Polytechnic College, Kellogg campus; personnel relations and business management analyst, San Luis Obispo.

LANDWEHR, ALFRED W. (1970) English
B.A. University of Missouri, 1963; M.A., 1964; Ph.D., 1970.

Experience: Instructor, Northern Arizona University; University of Missouri.

LANE, BOBBIE A. (1970) Men's Physical Education
B.S., Baylor University, 1963; graduate study, Baylor University, San Diego State College, Central Washington State College.

Experience: Player, San Diego Chargers football club; physical education instructor and coach, Yakima Valley Community College; head football coach, University of California, San Diego.

LANG, MARTIN T. (1969) Mathematics
B.A., North Central College, Naperville, Illinois, 1959; M.A., The University of Kansas, 1963; additional graduate study, University of Kansas, California Polytechnic State University, University of Texas at Austin.

Experience: Teaching assistant, University of Kansas; assistant instructor, University of Kansas, University of Texas at Austin; assistant professor, San Diego State College.

Faculty and Staff

LANGFORD, JAMES A. (1955).....Coordinator, Elementary Education
A.B., Western Kentucky Teachers College, 1937; M.A., 1947; Ph.D., University of Michigan, 1953; additional graduate study, Stanford University.

Experience: Teacher and administrator in public schools in Kentucky; principal, elementary school, Wayne, Michigan; assistant professor of Education, University of Nevada; communications officer, U.S.N.R.; chief of party, Cal Poly-A.I.D., Botswana.

LANGFORD, W. REED (1969).....Physics
B.S., Utah State University, 1954; M.S., Michigan State University, 1960; additional graduate work, Brigham Young University.

Experience: Teaching assistant, Utah State University and Brigham Young University; officer, U.S. Army; research assistant, Michigan State University and Brigham Young University; project engineer, Sperry Utah Company.

LANSMAN, PAUL S. (1964).....Mathematics
A.B., M.A., Washington University, 1932; Ph.D., 1934; additional graduate study, California Institute of Technology.

Experience: Instructor, St. Louis Junior College; mathematician, Subterrex Geophysical Company, Airborne Instruments Laboratory and Stoddart Aircraft Radio Company; engineer, Lockheed Corporation; Lawson Crystal Company and Lawson Import Company.

LAPORTE, RONALD L. (1972).....Social Sciences
B.A., California State College, Long Beach, 1968; graduate study, University of Southern California.

Experience: Trainee, Population Research Laboratory, U.S.C.; research assistant, Public Systems Research Institute, U.S.C.; teaching assistant, U.S.C.; instructor, Occidental College.

LARSEN, STUART E. (1969).....Aeronautical Engineering
B.S., University of Cincinnati, Cincinnati, Ohio, 1963; M.S., 1965; M.S. Eng., Arizona State University, Tempe, Arizona, 1969.

Experience: Engineering Aide, Bell Aerospace Systems, Niagara Falls, New York and Republic Aviation, Farmingdale, New York; test engineer, Hypersonic Aerodynamic Research Group, University of Cincinnati; design engineer, General Electric, Flight Propulsion Division, Evendale, Ohio; consulting engineer, Dynamic Science AVSER, Deer Valley, Arizona; faculty associate, Arizona State University, Tempe, Arizona.

LARSON, LOIS L. (1962).....Graduate Nurse
R.N., Swedish Hospital, School of Nursing, Minneapolis, Minnesota.
Experience: General duty, office nurse.

LASCOLA, RUSSELL A. (1970).....Philosophy
B.A., California State College at Los Angeles, 1962; M.A., University of Southern California, 1964; Ph.D., 1969.

Experience: Teaching assistant, University of Southern California; lecturer, Mt. Saint Mary's College; instructor, Glendale College, Los Angeles City College; educational consultant, Educational and Youth Opportunities Agency, Los Angeles.

LAU, JAMES B. (1971).....Business Administration
A.B., Eastern State University, Michigan, 1948; M.A., 1950; Ph.D., University of Michigan, 1954.

Experience: Teaching fellow and resident assistant, Research Center Group Dynamics, University of Michigan; Detroit Edison Company; chief, Psychological Services, Executive and Organizational Development-C.I.A.; lecturer, Behavioral Sciences, George Washington University; professor, Organizational Behavior and dean, Federal Executive Institute, Charlottesville, Virginia; visiting professor of Organizational Behavior, Graduate School of Business Administration, University of Virginia; officer, U.S. Army.

- LAUMANN, GEORGE C. (1957)** Mathematics
 A.B., Chico State College, 1952; M.A., 1953; additional graduate study, University of Oregon, University of California at Los Angeles.
 Experience: Instructor, Ordnance Department, United States Army; teacher, California high schools; instructor, Adult Evening College, Chico; participant, National Science Foundation Institute, Portland State College.
- LAWSON, JOHN D. (1951)** Director, Activities
 B.S., University of California, Berkeley, 1938; M.Ed., University of California, Davis, 1955; Ed.D., Stanford University, 1963.
 Experience: Vocational instructor; officer, U.S. Navy; special supervisor, State Bureau of Agricultural Education.
- LEE, THOMAS J. (1952)** Men's Physical Education
 B.A., San Jose State College, 1949; M.A., Stanford University, 1950.
 Experience: Player-coach, All-American Professional Basketball Team; instructor, private gymnasium, Oakland; playground director, Hayward Recreation District; U. S. Army.
- LEIGHTY, RAYMOND V. (1957)** Soil Science
 B.S., University of Maryland, 1938; M.S., 1940.
 Experience: Supervisory soil scientist (Land Classification and Survey), USDA, Soil Conservation Service, Kentucky; party chief, SCS, Virginia, Georgia. U. S. Army, CE.
- LEONESIO, ROBERT B. (1972)** Metallurgical Engineering
 B.S., University of Massachusetts, 1963; M.S., Stanford University, 1964; Ph.D., Lehigh University, 1970.
 Experience: Instrumentation development engineer, Sandia Corporation, Livermore, California; research and teaching assistant, Lehigh University; assistant professor, Naval Postgraduate School, Monterey, California.
- LEONG, KINGSTON L. (1970)** Biological Sciences
 B.S., University of Hawaii, 1963; M.S., 1966; Ph.D., Oregon State University, 1970.
 Experience: Research assistant, University of Hawaii and Oregon State University; termite control advisor, Fumaseal-Honolulu.
- LEVISON, ROBERT L. (1969)** Education
 B.S., Southern Oregon College, 1963; M.Ed., University of Wyoming, 1966; Ed.D., New Mexico State University, 1972.
 Experience: High school teacher, Central Point, Oregon; high school counselor, McKinleyville, California; counselor, New Mexico State University; psychometrist counselor, La Tuna Federal Prison, La Tuna, Texas.
- LEWIS, GEORGE M. (1967)** Mathematics
 B.A., Stanford University, 1961; M.A., University of Southern California, 1964; Ph.D., University of Southern California, 1970.
 Experience: Instructor, San Fernando Valley State College; teaching, research assistant and instructor, University of Southern California.
- LINDAMOOD, CHARLES H. (1958)** English
 B.A., University of Minnesota, 1949; M.A., Columbia University, 1951; additional graduate study, University of Minnesota, Stanford University, 1957.
 Experience: Teacher, high school, Salinas; instructor, University of Minnesota, College of Puget Sound, and Taft College, Ft. Ord, Ft. Lewis and McChord Field, Washington.
- LINDSAY, WILLIAM B. (1968)** Electronic and Electrical Engineering
 B.S., Morningside College, 1941; M.S.E.E., University of Wisconsin, 1953; E.E., Stanford University, 1961; graduate, U.S. Army Command and General Staff College, 1964.
 Experience: Officer, U.S. Army radar maintenance; instructor, Armed Forces Special Weapons Project; nuclear effects engineer; Signal Operations Officer, Eighth U.S. Army (Korea); R&D program manager, Office of the Secretary of Defense; Signal Battalion Commander; Director of Operations, U.S. Army Strategic Communications Command, Europe; Chief, Office of Communications-Electronics, U.S. Army Materiel Command.

Faculty and Staff

- LINDVALL, JOHN R. (1973)** Business Administration
B.A., Whitman College, 1962; M.B.A., Indiana University, 1971; additional graduate study, Indiana University.
Experience: Management trainee, People's National Bank; salesman, Moore Business Forms; salesman, Xerox Corporation.
- LINT, ROBERT G. (1967)** English
A.B., University of Michigan, 1948; M.A., 1948, 1950; Ph.D., Ohio University, 1967.
Experience: High school teacher, Michigan, Washington; instructor, Lower Columbia College; teaching fellow, instructor, assistant professor, Ohio University.
- LITCHFIELD, PETER M. (1970)** Psychology
B.A., University of Michigan, 1963; M.A., San Diego State College, 1967; Ph.D., University of Portland, 1971.
Experience: Part-time English instructor, Centro Cultural-San Jose, Costa Rica; owner, guitar importing firm, Ann Arbor, Michigan; owner, truck firm, Guatemala and Costa Rica; partner, Quality Latin Imports, San Diego; social worker, County of San Diego; laboratory instructor and research assistant, University of Portland.
- LOPER, WILLARD H. (1955)** Agricultural Engineering
B.S., New York College of Agriculture, Cornell University, 1953.
Experience: Dairy and general farming, New York; machinist, Westinghouse Electric Corp., Buffalo, New York; mechanic-welder, New York State College of Agriculture, Cornell University; student assistant instructor, Cornell University; salesman, Holz Co., Ukiah; journeyman welder, draftsman, Cochran Equipment Company, Salinas.
- LOUGHRAN, BERNICE B. (1958)** Head, Art Department
B.S., Newark State Teachers College, 1940; M.A., Ohio State University, 1946; Ed.D., Stanford University, 1958.
Experience: Elementary school teacher, Southbury, Conn., Santa Barbara, California, and Redwood City, California; elementary art teacher, Irvington, New Jersey; art instructor, Johnson Teachers College, University of Connecticut and Danbury Teachers College.
- LOWRY, JOHN J. (1962)** Mathematics
B.S., United States Military Academy, West Point, 1947; M.A., California State Polytechnic College, 1963; M.S., University of Illinois, 1967.
Experience: Officer and navigation instructor, U.S. Air Force; engineer, Boeing Company.
- LUKES, THOMAS M. (1962)** Acting Head, Food Industries Department
B.S., San Jose State College, 1947; M.S., University of California at Berkeley, 1949.
Experience: Microbiologist for Real Gold Citrus Products, Anaheim; laboratory supervisor, Gentry Division of Consolidated Foods, Gilroy.
- LUSCHEI, MARTIN L. (1969)** English
B.A., Nebraska Wesleyan University, 1952; M.F.A., University of Iowa, 1960; Ph.D., University of New Mexico, 1970.
Experience: Instructor, U.S. Army, Japan, University of Iowa, University of Texas; assistant cultural affairs officer, U.S. Information Service, Colombia.
- LUTHRA, SHAM S. (1972)** Computer Science and Statistics
B.A., Panjab University, India, 1952; M.A., 1954; M.S., University of Alberta, Edmonton, Canada, 1969; additional graduate study, University of Minnesota.
Experience: Lecturer, Government College, Panjab, India; teaching/research assistant, University of Alberta, Edmonton, Canada; administrative assistant, research assistant, teaching associate, University of Minnesota; instructor, College of St. Thomas, St. Paul, Minnesota.
- LUTRIN, CARL E. (1970)** Political Science
B.A., Adelphi University, 1962; M.S., University of Wisconsin, 1965; Ph.D., University of Missouri, 1971.
Experience: Instructor, Kellogg Community College; assistant instructor, University of Missouri.

- MacDONALD, LACHLAN P. (1968)**.....Director, Information Services/English
M.A., University of Chicago, 1957.
Experience: Journalist: Daily Mining Gazette, Michigan; Anchorage Daily Times, Alaska; Associated Press Seattle Bureau; KBYR, Alaska; City News Service, Los Angeles; public information: U.S. Army, Alaska; Alaska National Guard; editor: Chicago Review, Coastlines, The Humanist; lecturer, University College, University of Chicago; teacher, Webb School of California; at California State Polytechnic College, Kellogg-Voorhis, news bureau director, associate professor and journalism coordinator, director of information services; free-lance writer and photographer.
- MACH, GEORGE R. (1954)**.....Mathematics
B.A., Iowa State Teachers College, 1950; M.S., State University of Iowa, 1951; Ph.D., Purdue University, 1963.
Experience: National Science Foundation faculty fellow, Purdue University; graduate teaching assistant, Purdue University; visiting professor, National Science Foundation Summer Institute, Washburn University, Kansas; officer, U.S. Navy.
- MacKENZIE, F. HELEN (1966)**.....Library
B.A., University of California, Berkeley, 1941; Certificate of Librarianship, 1943; M.A., University of Denver, 1961.
Experience: Librarian, Mary Holmes Junior College, West Point, Mississippi; cataloger, Los Angeles County Law Library, University of Dubuque Seminary Library, California State Library, Sutro Branch, San Francisco, California.
- MADDEN, BRUCE E. (1970)**.....Food Industries
B.S., California State Polytechnic College, San Luis Obispo, 1968.
Experience: Supervisor, Planning and Scheduling, Campbell Soup Company, Modesto; U.S. Navy.
- MAGER, HANS L. (1949)**.....Architecture
M.S., Royal University of Technology, Sweden, 1947; additional graduate study, University of Colorado, University of West Virginia, University of Technology, Vienna, Austria.
Experience: Structural engineer, Building Concern; H.S.B., Stockholm, Sweden; consulting engineer with architects and engineers in Southern and Central California. Registered professional engineer, California and Sweden.
- MAGUR, LEON W. (1958)**.....Physics
B.S., California State Polytechnic College, 1958; M.S., University of Northern Colorado, 1971.
Experience: Electronic technician.
- MAKIN, LOIS C. (1966)**.....Library
B.A., University of California, Berkeley, 1930; Certificate of Librarianship, Library School of the Los Angeles Public Library, 1931; School Librarianship Certificate, UCLA, 1937.
Experience: Branch Library, Oakland, Bookmobile and branch librarian, Honolulu, Hawaii; Librarian, Elementary Schools, Long Beach, California; humanities reference librarian, San Jose State College.
- MAKSODIAN, Y. LEON (1963)**.....Computer Science & Statistics
B.S., California State Polytechnic College, 1957; M.S., University of Minnesota, 1961; Ph.D., University of Minnesota, 1970.
Experience: Instructor, Westmont College, Northwestern College; teaching assistant and instructor, University of Minnesota; junior development engineer, Minneapolis Honeywell Company.
- MALINOWSKI, STANLEY A., JR. (1973)**.....Music
B.A., Columbia University, 1969; graduate study, Cornell University.
Experience: Choral conductor, Cornell University.
- MALMBORG, FREDRICK B. (1969)**.....Mechanical Engineering
B.S., New York University, 1955; M.S. Columbia University, 1966.
Experience: Mathematician, Harvard University; engineer, North American Aviation, Inc. and United Nuclear Corporation, Elmsford, New York; assistant professor, Rochester Institute of Technology, Rochester, New York.

Faculty and Staff

- MANNING, JOHN H. (1956)** Mathematics
A.B., Oakland City College, 1937; M.A., University of Cincinnati, 1939; D.Ed., Pennsylvania State University, 1954.
Experience: Instructor in secondary schools of Ohio and Pennsylvania; U. S. Army Signal Corps; professor at Mansfield, Pennsylvania, State Teachers College.
- MARK, WALTER R. (1972)** Natural Resources Management
B.S., Utah State University, 1968; M.S., Colorado State University, 1970; Ph.D., 1972.
Experience: Forest technician, Forest Service, U.S.D.A.; graduate research and teaching assistant, Colorado State University; research associate, Rocky Mountain Forest and Range Experiment Station.
- MARKOS, HARRY G. (1968)** Dairy and Poultry Science
B.S., Utah State University, 1963; M.S., University of Illinois, 1966; Ph.D., University of Illinois, 1968.
Experience: Research and teaching assistant, University of Illinois.
- MARLOWE, ROY H. (1971)** Child Development
B.A., Brigham Young University, 1966; M.S., 1968; Ph.D., Florida State University, 1971.
Experience: Graduate teaching assistant, Brigham Young University; instructor, The Church College of Hawaii, Laie, Hawaii; graduate teaching assistant, Florida State University; part-time counselor, Florida State University Counseling Center and Wakulla High School, Tallahassee.
- MARTINEZ, ANGELINA (1966)** Library
B.A., Inter-American University, San German, Puerto Rico, 1943; B.S., Louisiana State University, 1945; M.S., University of Illinois, 1957.
Experience: Assistant Librarian, Inter-American University; Cataloger Pan-American Union, Organization of American States; head librarian, Inter-American Institute of Agricultural Sciences of the Organization of the American States, Costa Rica; head reference librarian, University of California, Davis; director of reader services, Nevada State Library.
- MATHENY, ROBERT (1952)** Supervisor of Transportation
B.S., California State Polytechnic College, 1962.
Experience: International Harvester Company, Des Moines, Iowa; diesel and heavy duty machinery mechanic, Army Air Corps; dealer and sales, Allis Chalmers, Point Arena.
- MAUGHAN, SCOTT J. (1965)** History
B.A., Brigham Young University, 1957; M.A., University of Utah, 1959; Ph.D., 1968.
Experience: Instructor, Eastern Montana College, University of Utah; U.S. Army.
- MAYO, EDWARD L. (1968)** History
B.A., Claremont Men's College, 1959; M.A., 1966; B.F.T. American Institute for Foreign Trade, 1962; Ph.D., Claremont Graduate School, 1969.
Experience: Securities analyst, Title Insurance and Trust Company; sales representative, Western Airlines; instructor, Pitzer College, Mt. San Antonio College.
- MCCALEB, DONALD L. (1962)** Public Information Specialist
B.S., Los Angeles State College, 1958; M.A., California State Polytechnic College, 1970.
Experience: Public information, U.S. Air Force; film representative and office manager, Billy Graham Films, North Hollywood; teaching and public relations, Marysville Union High School; director of public relations, associated students of Los Angeles State College.
- McCOMBS, JOHN W. (1960)** Electronic and Electrical Engineering
B.S., Clemson University, 1950; B.S., 1957; M.S., 1961; M.A., Northern Arizona University, 1971.
Experience: High school teacher, Greenwood, S.C.; instructor, Clemson University; engineer, Greenwood Mills, Lockheed Aircraft Corp., Autonetics, Inc.; officer, U.S. Army Signal Corps.

McCORKLE, ROBERT E. (1962) Director, International Education
B.S., California State Polytechnic College, 1960; M.S., University of California, 1962; additional graduate study, Oregon State University, University of Wisconsin.
Experience: Research statistician, Department of Agricultural Economics, University of California; research assistant, Farm Economics Division, Economic Research Service, United States Department of Agriculture; chief of party, Cal Poly-A.I.D., Zambia; chief farm management officer, Ministry of Agriculture, Lusaka, Zambia.

McCORMAC, WESTON A. (1968) Business Administration
B.A., Golden Gate College, 1967; M.B.A., 1968; M.P.A., University of Southern California, 1972.

Experience: Account executive, Merrill Lynch, Pierce, Fenner & Smith; instructor in public speaking, teaching techniques, personnel management, planning methods and leadership, Ft. Sill Artillery School; manpower and administrative analyst, Office of Assistant Secretary of Defense (Manpower); executive officer for Chief of Public Information of the Army, Washington, D.C.; director of Army Personnel Management Program; Commanding Officer of the Army Personnel Center at Oakland Army Base.

McDOUGALL, MICHAEL E. (1972) Architecture
B. Arch., University of Hong Kong, 1955; Master of Regional Planning, Cornell University, 1958.

Experience: Assistant architect, Eric Cumine & Associates, Hong Kong; planner/draftsman, John Carl Warnecke & Associates, San Francisco; urban designer/project planner, Wilsey, Hamm & Blair, Millbrae, California; principal planner, Ruth & Krushkhov, Berkeley; planner, Leo A. Daly & Company, San Francisco; visiting critic, University of Manitoba, Winnipeg; principal, Michael McDougall & Associates, Richmond, California.

McGONAGILL, WILLARD L. (1967) Architecture
B.S., Colorado University, 1955; B. Arch., 1956.

Experience: Associate, Weaver & Drover, Architects; project manager, Kerr-Beggs, Architectural Engineers; draftsman, Blakey Architects, Langhart Architect; registered architect, California.

McGRATH, JAMES M. (1946) Head, Engineering Technology Department
B.A., Santa Barbara State College, 1941; M.A., California State Polytechnic College, 1953.

Experience: Chief, U.S. Army Transport Service; superintendent of machinery, U.S. Naval Yard, Manila; officer, U.S. Navy; consultant, USAID, Africa.

McKINSTRY, JOHN A. (1968) Social Sciences
A.B., University of California, Los Angeles, 1961; A.M., University of Southern California, 1963; Ph.D., University of Southern California, 1970.

Experience: Teacher, Venice High School; instructor and Assistant to Dean of Men, University of Southern California.

McMEEN, GEORGE H. (1960) Mathematics
B.A., Western Washington College of Education, 1934; M.Ed., University of Washington, 1947; Ed.D., Columbia University, 1953.

Experience: Elementary, junior high, junior college, and state college teaching; air navigation officer, U.S. Navy; professor and chairman, mathematics department, Newark State College, Newark, New Jersey; Special Consultant in Mathematics, California State Department of Education, 1961-62.

McMORRAN, WAYNE E. (1962) Electronic and Electrical Engineering
B.S., California State Polytechnic College, 1960; M.S.E.E., New York University, 1962.

Experience: Technician, Western Electric Company, Shell Development Company; member of the technical staff, Bell Telephone Laboratories, Murray Hill, New Jersey; electronics engineer, Lawrence Radiation Laboratory, Livermore, California and Jet Propulsion Laboratory, Pasadena.

Faculty and Staff

- McNEAL, LYLE G. (1969)**..... Animal Science
B.S., California State Polytechnic College—Kellogg, 1964; M.S., University of Nevada, 1966; Additional graduate study, Utah State University.
Experience: Agricultural Extension Agent, University of Nevada Cooperative Extension Service, Gardnerville, Nevada; Graduate Research Assistant in Animal Breeding, University of Nevada; Ranching operations in Nevada, Montana, and Utah; Assistant Manager, Riding Stable, Agoura, California.
- McRAE, GLENN G. (1963)**..... Counselor
A.B., University of Tampa, 1949; M.Ed., University of Florida, 1954; D.Ed., 1959.
Experience: Graduate assistant, fellow, teaching assistant, University of Florida; instructor, St. Petersburg Junior College; visiting summer lecturer, Mississippi State University, Louisiana State University, Northwest Louisiana State College, and State College of Iowa.
- McROBBIE, J. M. (1962)**..... Head, Industrial Technology Department
A.B., San Jose State College, 1950; M.A., San Diego State College, 1955; Ed.D., University of Northern Colorado, 1963; additional graduate study, Purdue University, 1967.
Experience: Patternmaker, The Boeing Company, Seattle; trade-technical instructor and civilian personnel recruiter, Puget Sound Naval Shipyard, Bremerton; industrial arts teacher, Santa Clara County; industrial arts teacher-consultant, San Diego County Schools; coordinator of industrial education, Tulare County Schools.
- MENDENHALL, CHARLES E. (1967)**..... Director, Alumni Affairs
Experience: Reporter-printer, Livermore, Calif., Herald; personnel clerk, US Army; public relations director, Stockton, Calif.; Union Stock Yards; farm editor, The Modesto, Calif., Bee.
- MENG, SHIEN YI (1968)**..... Electronic and Electrical Engineering
B.S., Taiwan Provincial Cheng Kung University, 1953; M.S., Oklahoma State University, 1958; Ph.D., Ohio State University, 1968.
Experience: Research associate, Ohio State University; research assistant, Cornell University; engineer, Taiwan Provincial Government.
- MERIAM, JAMES L. (1972)**..... Mechanical Engineering
B.E., Yale University, 1939; M. Eng., 1941; Ph.D., 1942.
Experience: Engineer, Pratt and Whitney Aircraft and General Electric Company; Lt. (jg) U. S. Coast Guard; assistant, associate, and full professor of mechanical engineering and engineering mechanics, assistant dean of graduate studies, and chairman Division of Mechanics and Design, University of California, Berkeley; Board of Directors, Engineers Council for Professional Development; dean, School of Engineering and director, Research and Development, Duke University.
- MERRIAM, JOHN L. (1958)**..... Agricultural Engineering
B.S., California Institute of Technology, 1938; graduate study, California Institute of Technology.
Experience: Instructor, California Institute of Technology; junior civil engineer, U. S. Army Engineers and private consulting engineers; civil area engineer, Soil Conservation Service, USDA; senior irrigation engineer, Ministry of Agriculture, Kingdom of Saudi Arabia; consulting irrigation engineer, The Ralph M. Parsons, Co., Egypt UAR; Institute Fomento Nacional de Nicaragua, and Food and Agricultural Organization, Riyadh, Saudi Arabia; irrigation engineer, California State Polytechnic College Project, USOM, Thailand.
- MESLER, FLORENCE (1962)**..... Graduate Nurse
R.N., Patterson General Hospital, New Jersey, 1939.
Experience: Industrial nurse, Wright Aero Corporation, Patterson, New Jersey; general duty nurse, Santa Monica Hospital, and French Hospital, San Luis Obispo; private duty, San Luis Obispo.
- MEYER, THOMAS O. (1955)**..... Food Industries
B.S., State College of Washington, 1949; M.S., 1953.
Experience: Instructor and meats specialist, State College of Washington; assistant animal husbandman, Experiment Station, State College of Washington, Pullman, Washington.

MILES, HERBERT L. (1963) Electronic and Electrical Engineering
B.S.E.E., Wayne State University, 1950; M.S.E.E., 1963; additional graduate study, Colorado State University.

Experience: Draftsman, Detroit Edison Co., City Engineer's Office; personnel recruiter and trainer, City of Detroit Civil Service Commission; instructor, Ferris State College; assistant professor, Wayne State University; registered professional engineer, California and Michigan.

MILLER, ALLEN D. (1960) Mathematics
B.S., Iowa State University, 1945; M.S., 1948; Ph.D., 1953.

Experience: High school mathematics teacher, Iowa, Nebraska, Wisconsin, and California; college mathematics teacher, Wisconsin, Illinois, Iowa and California; research development in industry, Hughes Aircraft Company; participant in National Science Foundation institutes, Stanford University, Bowdoin College, University of Arizona, University of Southwest Louisiana, Columbia University.

MILLER, ERNEST C. (1968) Business Administration

B.A., University of Chicago, 1941; M.B.A., 1946; Ph.D., University of Denver, 1954.

Experience: Supervisor, sales promotion, U.S. Rubber Company; director of personnel, comptroller, O. P. Baur Conf. Corp., Denver; part-time instructor, University of Denver; assistant general manager, Western Reddi-Wip Company; lecturer, University of Alaska and George Washington University; Lt. Colonel, U.S. Air Force.

MILLER, GRANT D. (1972) Psychiatrist

M.D., University of Minnesota Medical School, 1968; Internship, Santa Barbara Cottage and General Hospitals; Residency, University of Oregon Medical School, 1972.

MILLER, HAROLD R. (1968) Business Administration

B.S., University of Missouri, 1958; M.S., 1959.

Experience: First Lieutenant, U.S. Air Force; staff accountant, Williams, Keepers, Oliver, Payne & Rackers, CPA's, Columbia, Missouri; comptroller, Ozark Tractor and Implement, Springfield; instructor, Southwest Missouri State College; C.P.A.

MISIC, DRAGOSLAV M. (1970) Environmental Engineering

Diploma Engineer, University of Ljubljana, Yugoslavia, 1957; M.S., Ph.D., Northwestern University, Evanston, Illinois, 1963.

Experience: Research engineer, Whirlpool Corporation, Benton Harbor, Michigan; research associate, B.A.S.F., Western Germany; postdoctoral fellow, University of California, Davis.

MOERMAN, KAREN SUE (1969) Home Economics

B.S., University of Georgia, 1964; M.S., 1967.

Experience: Research technician, Georgia Agricultural Experiment Station; assistant professor, University of Georgia and Georgia Agricultural Experimental Station; visiting professor, Colorado State University.

MOIR, NEIL J. (1970) Chemistry

B.S., Lewis and Clark College, 1962; M.S., University of Oregon Medical School, 1966; Ph.D., 1968.

Experience: Graduate teaching instructor, University of Oregon Medical School; post doctoral fellow and research associate, Cornell University.

MONTGOMERY, DAVID H. (1956) Biological Sciences

B.S., California State Polytechnic College, 1954; M.A., College of the Pacific, 1956; additional graduate study, Friday Harbor Laboratories, University of Washington and University of California.

Experience: Laboratory assistant and teaching assistant, California State Polytechnic College; teaching fellow, College of the Pacific; summer faculty, Pacific Marine Biological Station, University of the Pacific; National Science Foundation fellow, Friday Harbor Laboratories; National Science Foundation fellow, University of California.

MOORE, LARRY D. (1967) Electronic and Electrical Engineering

A.B., Centre College, 1936; M.S., U.S. Naval Postgraduate School, 1951.

Experience: Officer, U.S. Navy, 1946-67; teacher, Ashland Senior High School.

Faculty and Staff

MOREY, KRISHNAKUMAR S. (1970).....Home Economics
B.S., Nagpur University, India, 1955; M.S., 1958; M.S., U.C. Medical Center, San Francisco, 1963; Ph.D., University of California, Berkeley, 1967.

Experience: Research scholar, Nagpur University; teaching assistant, University of California Medical Center; graduate biochemist, teaching assistant, University of California, Berkeley; research associate, Temple University Medical School, Philadelphia.

MORGAN, DONALD E. (1968).....Head, Industrial Engineering Department
B.S., Oregon State College, 1940; M.S., Stanford University, 1962; Ph.D., 1963.

Experience: Staff technical consultant, ARINC Research Corporation; staff member and partner, Decision Studies Group; professor, Stanford University; manager and partner, Intermountain Surgical Supply Company; engineer, Westinghouse Electric Corporation. Registered professional engineer, California.

MORGAN, RONALD R. (1970).....Architecture
B.A. Arch., University of California, Berkeley, 1966; M.A. Arch., University of Pennsylvania, 1969.

Experience: Project designer, Daniel, Mann, Johnson & Mendenhall, Washington, D.C.; designer, Francis & Cauffman, Philadelphia; draftsman, Skidmore, Owings and Merrill, San Francisco; independent work in San Francisco Bay Area.

MORRIS, DONALD M. (1957-62) (1969).....Associate Dean,
Continuing Education

B.S., M.A., California State Polytechnic College, 1953-1958; EdD., University of California at Los Angeles, 1968.

Experience: Resident supervisor-counselor and assistant personnel analyst, California State Polytechnic College; officer and pilot, U.S. Navy; instructor, University of California, Santa Barbara Extension Division; director of adult and summer schools, San Luis Obispo and Simi Valley Unified School Districts; instructor, assistant dean of instruction and coordinator community services, Moorpark College.

MORRIS, HAROLD D. (1965).....Agricultural Management
B.S., Utah State University, 1953; M.S., 1965.

Experience: Vocational agriculture teacher; county agriculture agent; A.S.C. office manager; commercial pilot and flight instructor; air traffic controller, FAA; research assistant, Utah State University Experiment Station; officer, U.S. Air Force.

MOTT, JOHN H., SR. (1967).....English
B.A., Southern Oregon College, 1962; M.A., California State Polytechnic College, 1965; Ed.D., University of Northern Colorado, 1970.

Experience: Special agent, U.S. Military Forces; art instructor, Boise Junior College; high school English and art teacher, Oregon, California; graduate assistant, Colorado State College.

MOTT, ROBERT A. (1946).....Head, Men's Physical Education
Department

B.S., University of Akron, 1938; M.A., University of Southern California, 1946; Ed.D., Stanford University, 1953.

Experience: Physical education instructor and athletic coach, Akron Public School System; officer, U.S. Navy; teaching assistant, University of Southern California; visiting professor University of Colorado; chairman, P.E. Department and chief of party, U.S. AID program, Evelyn Hone College of Further Education, Lusaka, Zambia; physical education specialist, Uganda, Somalia, and Ethiopia, U.S. State Department.

MOTT, W. STEPHEN (1972).....Graphic Communications
B.S., California State Polytechnic College, 1959; graduate study, California Polytechnic State University.

Experience: Production technician, California State Polytechnic College; lithographer, commercial printers, Tucson, Arizona; ten years additional experience in printing industry.

- MOUNTS, BILLY W. (1956)** Director, Health Services
M.D., Georgetown University, Washington, D.C., 1950.
Experience: Internship, Fitzsimons General Hospital, Denver; residency, San Luis Obispo General Hospital; four years private practice, Pismo Beach.
- MOY, CARL F. (1968)** Dairy and Poultry Science
B.S., University of Wisconsin, 1967.
Experience: U.S. Air Force; research assistant, University of Wisconsin; laboratory supervisor, The Borden Company; cultured products manager, Pensupreme Dairies, Inc.; quality control director, The Borden Company; member, Wisconsin Dairy Technology Society.
- MULDER, GEORGE (1968)** Director, Counseling & Testing
B.A., Long Beach State College, 1956; M.A., 1957; Ph.D., University of Southern California, 1971.
Experience: Associate Dean (Counseling) and counselor, California State Polytechnic College, Kellogg-Voorhis; teacher, Excelsior Union High School District; counselor-instructor, Cerritos College; electronic technician, U.S. Army Ordnance; drafting, tool design, and technical illustration, Goodyear Tire and Rubber and Shoffer Tool Company.
- MURPHY, PAUL F. (1970)** Mathematics
A.B., Catholic University of America, 1961; M.A., Brooklyn College, 1966; Ph.D., Michigan State University, 1971.
Experience: Graduate assistant, Michigan State University; participant, National Science Foundation Seminar, Bowdoin College.
- MYERS, ALBERT E. (1970-71) (1972)** Chemistry
B.S., California Institute of Technology, 1929; Ph.D., 1934; additional graduate study, Occidental College.
Experience: Teaching fellow, California Institute of Technology, Occidental College; manager, Process National Sales, Shell Oil Company.
- NAGLE, BRUCE D., MAJ. (1973)** Military Science
B.S., Rutgers University, 1961; M.S., Washington State University, 1970.
Experience: Commanding officer, Military Police Training Company, Fort Gordon; instructor, Provost Marshal General School, Fort Gordon; chief, Motor Movement Services Branch, Seine Area Command, Paris, France; intelligence operations officer, 18th MP Brigade, Fort Meade and Vietnam; commanding officer, MP Company, Vietnam Provost Marshal, Carlisle Barracks; correctional officer, Fort Lewis.
- NAJERA, DANIEL (1971)** Foreign Languages
B.A., Chilapa Seminary, 1956; graduate study, Graduate School of Theology, Mexico, California Polytechnic State University.
Experience: Administrative trainee, Economic Opportunity Commission; social worker and teacher, Instituto Mexicano del Seguro Social; instructor, Seminario de Acapulco.
- NEEL, PAUL R. (1962)** Director, School of Architecture
and Environmental Design
B.S., California State Polytechnic College, 1958; B. Arch., University of Southern California, 1962. M. Arch., University of Sheffield, 1969.
Experience: Designer-draftsman, W. D. Concolino, Monterey; designer, Quincy Jones, F.A.I.A., Los Angeles; private practice, California; visiting lecturer, University of Sheffield, England. Registered architect, California.
- NEELANDS, JAMES G. (1957)** Equipment Technician, Physical and
Biological Sciences
B.S., California State Polytechnic College, 1956; graduate study, University of Washington.
Experience: Teaching assistant and research assistant, University of Washington; naval aviator and officer, U.S. Marine Corps.

Faculty and Staff

NELSON, LINDEN L. (1970).....Psychology
B.A., University of Northern Iowa, 1966; Ph.D., University of California, Los Angeles, 1970.

Experience: Counselor and athletics instructor, Braemer Boys' Camp, Park Rapids, Minnesota; Boys' club leader, YMCA, Cedar Falls, Iowa; teaching assistant, research assistant, Department of Psychology, University of California.

NELSON, RICHARD F. (1960).....Head, Biological Sciences Department
B.S., Brigham Young University, 1955; M.S., 1957; Ph.D., State University of Iowa, 1960.

Experience: Teaching assistant, Brigham Young University, State University of Iowa; research associate in radiation biology, State University of Iowa.

NEWTON, CHARLES H. (1966).....Counselor
B.A., San Diego State College, 1950; M.A., Arizona State University, 1967; additional graduate study, Arizona State University, University of California, Santa Barbara.

Experience: Loftsmen, design draftsman, and tool designer, Ryan Aeronautical, Convair and Multiplex, Inc.; secondary school teacher, counselor and curriculum writer, San Diego City Schools; assistant school psychologist, Mesa, Arizona Public Schools; U.S. Air Force.

NICHOLSON, LOREN L. (1956).....Journalism
A.B., San Jose State College, 1946; M.B.A., Stanford University, 1947; additional graduate study, Stanford University.

Experience: Advertising sales representative, Watsonville Register-Pajaronian; advertising sales correspondent, Sunset Magazine; advertising director, Redding Record-Searchlight.

NICKELL, DELL O. (1965).....Architecture
B.A., San Jose State College, 1950; graduate study, Arizona State.

Experience: Assistant engineer, San Jose Water Works; associate bridge engineer, California State Bridge Department; partner, Gillette-Harris & Associate, Auburn; assistant road commissioner-surveyor, San Luis Obispo County. Registered civil engineer, California.

NIELSEN, KEITH E. (1959).....Speech Communication
B.A., Alma College, 1953; M.A., Stanford University, 1959; M.A.Ed., California State Polytechnic College, San Luis Obispo, 1966; Ph.D., Michigan State University, 1970.

Experience: Graduate assistant, Michigan State University; high school teacher, State of Michigan; professional actor and play director; ranger-naturalist, National Park Service and State of California; neuro-psychiatric nursing assistant, U.S. Veterans Administration Mental Hospital and St. Lawrence Hospital; farmer; power plant engineer; welder.

NILES, PHILIP W. B. (1967).....Environmental Engineering
B.S., University of California, 1957; M.S., 1958; additional graduate study, University of California, Los Angeles.

Experience: Consultant, Rand Corporation; teaching assistant and post-graduate research engineer, University of California, Los Angeles; senior research engineer, Rocketdyne.

NIU, SHIEN HWEI (1969).....Library
B.A., National Taiwan University, 1951; M.A., Bucknell University, 1957; additional graduate studies, University of Wisconsin; M.A., Library Science, Indiana University, 1967.

Experience: Assistant catalog librarian, Drake University Library.

NOLAN, THOMAS F. (1949).....Political Science
B.S., University of Wisconsin, 1935; M.A., University of Southern California, 1940; additional graduate study at the University of Zurich, Switzerland.

Experience: Instructor senior high school, Stockbridge, Wisconsin; instructor senior high school, Kaukauna, Wisconsin; instructor, American School, Quito, Ecuador; Economic Analyst, Department of State, Washington, D.C., Montevideo, Uruguay; Officer, U.S. Naval Reserve; Vice-Consul, Department of State, Washington, D.C. at Valparaiso, Chile.

- NORDQUIST, RAYMOND E. (1964)**.....Architecture
 B.S. Arch., Montana State College, 1950; M. Arch., University of California, Berkeley, 1971.
 Experience: Private architectural practice; principal partner, Nordquist & Sundell, Architects; chief designer, Cushing & Terrell; designer and draftsman for architects and building contractors in Montana and Washington. U.S. Army Air Corps. Registered architect, Montana, Wyoming and California.
- NORRIS, ROBERT E. (1970)**.....Social Sciences
 B.S., Arizona State University, 1962; M.A., 1965; Ph.D., University of Iowa, 1970.
 Experience: Teaching and research assistant, Arizona State and University of Iowa; instructor, North Texas State University and University of Iowa; assistant professor, Arizona State University; procedure writer and analyst, AiResearch Mfg. Co., Phoenix, Lockheed Missiles and Space Co., Sunnyvale, and Talley Ind., Inc., Mesa, Arizona; U.S. Air Force.
- NOSHY, AMEEN I. (1969)**.....Architecture
 B. Arch., Cairo University, 1963; M.S. Arch., Illinois Institute of Technology, Chicago, 1969; additional graduate work, University of Strathclyde.
 Experience: Draftsman in architectural firms in Cairo and West Berlin; designer and field supervisor in Development and Popular Housing Corp., Cairo; instructor at Al-Azhar University, Cairo; designer, Cairo, P. L. Nervi, Rome and C. F. Murphy, Assoc., Chicago.
- O'CONNOR, EUGENE L. (1964)**.....Business Administration
 B.S., St. Louis University, 1957; M.S., 1963.
 Experience: President, Western Data Management, San Luis Obispo, California; assistant manager, Knights of Columbus, Inc.; sales representative, Burroughs Corporation; executive director, Madison County Association for the Crippled, Inc.; instructor in business, Belleville Junior College.
- OFFERMANN, GENE P. (1970)**.....Crop Science
 B.S., Southern Illinois University, 1964; M.S., 1965; Ph.D., University of California, Davis, 1970.
 Experience: Research assistant, Southern Illinois University and University of California, Davis; general farming.
- O'LEARY, MICHAEL J. (1951)**.....Social Sciences
 A.B., San Francisco State College, 1950; M.A., Stanford University, 1951; additional graduate study, Stanford University, University of Oregon.
 Experience: Property accountant, U.S. Marine Corps Supply Depot; instructor and examiner-specialist, Air Force Radar Technical School; instructor, U.S. Armed Forces Institute.
- OLGUIN, LEONARD (1972)**.....Head, Foreign Languages
 B.A., California State College, Los Angeles, 1961; M.A., 1965; additional graduate study, University of Southern California.
 Experience: Supervisor of teacher training, University of California, Irvine; consultant, California State Department of Education; federal projects and foreign language coordinator, Fullerton Elementary School District; teacher, Los Nietos Elementary School District, Keppel Union School District.
- OLIVER, WILLIAM A. (1968)**.....Welding and Metallurgical Engineering
 B.S., California State Polytechnic College, 1966.
 Experience: Printer and draftsman, H. M. Gousha Co., San Jose; welder, On Manufacturing Company, San Jose; welding technician, Mare Island Shipyard, Vallejo; lecturer, California State Polytechnic College; welding engineer, Westinghouse Electric, Sunnyvale.
- OLSEN, BARTON C. (1968)**.....History
 B.A., University of Utah, 1955; M.A., 1966; Ph.D., 1968.
 Experience: Teacher, South High School, Salt Lake City; Washington Union and Sanger Union High School, California; principal, Cardston School District, Cardston, Alberta, Canada.

Faculty and Staff

- O'NEILL, GERTRUDIS M. (1972)** Library
 B.A., Inter-American University, Puerto Rico, 1955; M.F.A., University of Cincinnati, 1962; M.L.S., Western Michigan University, 1967; additional graduate study, Art Academy of Cincinnati.
 Experience: Graduate assistant, Western Michigan University; reference librarian, Public Library of Cincinnati and Hamilton County.
- ORLICK, STEVEN C. (1972)** Architecture
 B.A., University of California, Santa Barbara, 1969; M. Urban Planning, University of Washington, 1971.
 Experience: Junior consulting assistant, Resources, Applications, Designs and Controls, Inc., Los Angeles; teaching assistant and research assistant, Urban Transportation Research and Training Program, University of Washington; research associate, Urban Transportation Research, University of Washington; assistant graduate program advisor, Training Program and Department of Urban Planning, University of Washington.
- ORTIZ, MARIA E. (1972)** Biological Sciences
 B.S., Southwest Texas State University, 1968; M.A., 1970; Ph.D., Texas Women's University, 1973.
 Experience: Laboratory instructor, Southwest Texas State University; laboratory instructor and research assistant, Texas Woman's University.
- OSTEYEE, LEON F. (1957)** Mechanical Engineering
 B.M.E., Rensselaer Polytechnic Institute, 1945; M.M.E., 1957; additional graduate study, Massachusetts Institute of Technology.
 Experience: Instructor, Rensselaer Polytechnic Institute; designer, General Electric Company; American Locomotive Co.; ship superintendent, U.S. Naval Shipyard, Bremerton, Washington; registered professional engineer, California and New York.
- O'TOOLE, FREDERICK J. (1972)** Philosophy
 B.A., University of California, Los Angeles, 1966; M.A., University of California, Davis, 1968; Ph.D., 1972.
 Experience: Lecturer, California State College, Hayward; associate in philosophy, University of California, Davis; teaching assistant, University of California, Davis and Los Angeles.
- OWEN, EVAN R. (1969)** Head, Electronic and Electrical Engineering Department
 B.S., Northwestern University, 1945; M.S., University of Pennsylvania, 1949; Ph.D., Northwestern University, 1953.
 Experience: Manager of Advanced Engineering, Apollo Systems Department, manager, Nuclear Systems Unit, Atomic Power Department, development engineer, Aeronautics and Ordinance Department, General Electric Company; instructor, Northwestern University. Registered professional engineer, California, Florida.
- OZAWA, KENNETH S. (1963)** Physics
 B.S., John Carroll University, 1959; M.S., 1960; additional graduate study, Texas A & M, University of California.
 Experience: Graduate assistant and instructor, John Carroll University.
- PAGE, PERRYMAN L. (1963)** Library
 B.A., University of Mississippi; M.S.L.S., Louisiana State University, 1963.
 Experience: U.S. Air Force.
- PAPKYRIAZIS, PANAGIOTIS A. (1971)** Economics
 B.A., Athens School of Economics and Business Science, 1964; graduate study, University of California, San Diego.
 Experience: Cost analyst, Marinopoulos Pharmaceutical Corporation, Greece; research assistant, Center of Planning and Economic Research, Board of Experts, Greece; teaching and research assistant, University of California, San Diego.
- PATTERSON, SHANNON R. (1970)** Library
 B.A., University of Colorado, 1965; M.L.S., Rutgers University, 1966.
 Experience: Reference Librarian, University of British Columbia.

- PAUL, GORDON J. (1969)**..... Business Administration
B.S., Montana State College, 1957; M.B.A., University of New Mexico, 1966.
Experience: Controller and treasurer, The Dikewood Corporation, Albuquerque; manager, financial accounting, ACF Industries, Inc., Albuquerque; tax accountant, Caterpillar Tractor Company, Peoria, Illinois.
- PAUTZ, ROLAND K. (1959)**..... Dairy and Poultry Science
B.S., Oregon State College, 1957; M.S., Oregon State University, 1968.
Experience: Research assistant, Oregon State College, 1957-59.
- PEDERSON, WILLARD M. (1961)**..... Head, English Department
A.B., Colorado Western State College, 1937; M.A., Colorado State College, 1938; additional graduate study, Colorado State College, Western Reserve University, Colorado State University.
Experience: English teacher and football coach, Shaker Heights High School, Cleveland, Ohio; English instructor, football coach and athletic director, Mount Union College; associate professor and director of athletics, Marshall College; associate professor and athletic coach, Colorado Western State; professional athletics; officer, Navy Underwater Demolition.
- PELLATON, EVELYN I. (1966)**..... Women's Physical Education
B.A., San Francisco State College, 1950; M.A., 1953.
Experience: Director, Oakland Recreation Department; official and gym supervisor, San Francisco Recreation Department; summer camp counselor; WAVE athletic officer, Special Services, U.S. Navy; instructor, Marin Catholic High School, Portola Junior High School; dean-counselor, Portola Junior High School, Downey Junior High School.
- PENDSE, PRATAPSIHA C. (1966)**..... Biological Sciences
B.S., Bombay University, 1947; M.S., Poona University, 1951; M.S., Utah State University, 1959; Ph.D., 1965; additional graduate study, Stanford University, Yale University, McGill University, The Johns Hopkins University, School of Medicine.
Experience: Lecturer, Bombay and Poona Universities; teaching and research assistant, Utah State University; assistant professor, Colgate University.
- PERELLO, DOMINIC B. (1954)**..... Economics
A.B., University of California, Santa Barbara College, 1951; M.S., University of Wisconsin, 1952; additional graduate study, University of California at Los Angeles.
Experience: Officer, U.S. Air Force; partner, Perello and Sons; teaching assistant, University of California at Los Angeles.
- PERRYMAN, ELIZABETH K. (1972)**..... Biological Sciences
B.S., Memphis State University, 1964; M.S., Texas Technological College, 1967; Ph.D., The University of Arizona, 1972.
Experience: Teacher, West Memphis High School; teaching assistant, Texas Tech University; instructor, The Victoria College, Victoria, Texas.
- PETERS, JAMES M. (1958-60) (1963)**..... Chemistry
A.B., University of California, 1953; Ph.D., 1957.
Experience: Biochemist, University of California; instructor, California State Polytechnic College; biochemist, Baltimore City Hospitals; assistant professor, University of Maryland.
- PETERS, RALPH A. (1969)**..... Physics
B.S., Georgetown University, 1949; M.S., Pennsylvania State University, 1951; Ph.D., Fordham University, 1967.
Experience: Assistant professor, Lewis College; instructor and graduate assistant, Michigan State University; assistant professor, Fordham University; associate professor, University of the Pacific.
- PETERSON, JAMES J. (1964)**..... English
B.A., Bradley University, 1952; M.A., University of Pennsylvania, 1956; additional graduate study, Temple University, University of Pennsylvania.
Experience: Assistant instructor, University of Pennsylvania; substitute teacher, Philadelphia Public Schools; high school instructor, Bryn Mawr, Pennsylvania; instructor, Susquehanna University, New York State University.

Faculty and Staff

PHAKLIDES, WILLIAM J. (1963).....Engineering Technology
B.S., California State Polytechnic College, 1956; graduate study, Montana State University.

Experience: U.S. Army and U.S. Navy; design engineer, Baker-Newman Co., Inc., and Barium Products, Ltd., Modesto; Conditioned Air, Fresno; consultant, U.S. Naval Weapons Center, China Lake. Registered professional engineer, California.

PHILLIPS, PETER K. (1968).....Facilities Planner
B.S., California State Polytechnic College, 1959.

Experience: Designer-draftsman, John R. Ross and Associates, Inc., San Luis Obispo and Arendt/Mosher/Grant, Architects, Santa Barbara; private practice. Registered architect, California; A.I.A.

PHILLIPS, WILLIAM R. (1957).....Director, School of Architecture
and Environmental Design

B.Arch., University of Southern California, 1952; M.Arch., University of Hawaii, 1971.

Experience: Designer, W. H. Harrison, Architect; Sponseller & Sons; U.S. Engineer Department; engineer, North American Aviation, Inc.; fallout shelter analysis, Office of Civil Defense, Dept. of Army. Registered architect, California.

PIMENTEL, RICHARD A. (1952).....Biological Sciences
A.B., San Jose State College, 1947; M.S., Oregon State College, 1950; Ph.D., 1952.

Experience: Officer, U.S. Army; teaching assistant, Oregon State College; ranger-naturalist, Crater Lake National Park; associate professor, University of California Extension Nature Study Institute at Santa Barbara; lecturer, National Science Foundation Summer Science Program.

PINARD, LEO W., II (1970).....Social Sciences
B.A., University of Santa Clara, 1962; M.A., University of Notre Dame, 1963; Ph.D., 1971.

Experience: Teaching assistant, University of Notre Dame; lecturer, Immaculate Heart College; fertility research, USAID, Philippines.

PIPER, CURTIS DEAN (1964).....Head, Soil Science Department
B.A., W. T. Bryan University, 1953; M.S., Michigan State University, 1959; Ph.D., 1967.

Experience: Farm operator; food service director, Kings College; instructor in research and teaching, Michigan State University.

PIPPIN, LOUIS D. (1970).....Education
B.S., West Texas State College, 1952; M.Ed., 1956; Ed.D., North Texas State University, 1970.

Experience: Teacher, Baird, Happy and Amarillo, Texas; counselor, Amarillo High School; visiting professor, North Texas State University; U.S. Army.

POHL, JENS G. (1973).....Architecture
B. Arch., University of Melbourne, Australia, 1964; M. Building Science, University of Sydney, Australia, 1967; Ph.D., 1970.

Experience: Private practice and consultant, Sydney, Australia; lecturer, University of New South Wales, Australia; post-graduate tutor, Department of Education and Science, Commonwealth of Australia; demonstrator, University of Sydney, Australia; architect, Public Works Department of Victoria, Australia; temporary teacher, State Education Department of Victoria.

POLK, BENJAMIN K. (1966).....Architecture
Diploma, School of Planning and Research in Regional Development, England, 1952.

Experience: Private practice in architecture and planning, 1948-1965. Registered architect, California; NCARB registration.

PRATER, EUGENE G. (1967).....English
B.A., Phillips University, 1952; B.D., Vanderbilt University, 1954; M.A., 1955; additional graduate study, Harvard University, American University, Stockholm University, Ludwig-Maximilians Universitdt, University of Southern California.

Experience: Naval chaplain; assistant professor, Curry College, Ball State University, University of Maine at Machias, California State University, Long Beach; instructor, University of San Francisco; adjunct professor of New and Old Testament, Chapman College.

PRATT, RUTH M. (1972).....Graduate Nurse
L.V.N., Glendale College, 1960; R.N., Los Angeles City College, 1966.

Experience: Public health nurse, Ross Loos Medical Group; office nurse, Glendale; general duty nurse, San Luis Obispo Convalescent Hospital.

PRICE, D. JOHN (1957).....Mechanical Engineering
National Certificate in M.E., Dudley and Staffordshire Technical College, 1950; B.S., California State Polytechnic College, 1954.

Experience: Engineer, British Electricity Authority; assistant planning engineer, British Columbia Telephone Co.; technical assistant, Vickers Armstrong Ltd.; officer, RCAF.

PRITCHARD, EILEEN ELLEN (1973).....Library
B.A., California State University, Chico, 1961; Ph.D., University of Kansas, 1967; M.L., Kansas State Teachers College, 1972.

Experience: Graduate assistant, University of Kansas; trainee, National Institutes of Health, University of Kansas; assistant professor, Northern Arizona University.

PUNCHES, GERALD N. (1971).....Registrar
B.A., Western Washington State College, 1970; M.Ed., 1971.

Experience: Officer, patrol plane commander, primary flight instructor, U.S. Navy; high school science and mathematics teacher, Bellingham, Washington.

QUEZADA, OSCAR (1970).....Administrative Assistant to the President
B.S., California State Polytechnic College, San Luis Obispo, 1970; M.A., 1971.

Experience: Teacher, Adult Education, Atascadero High School; lecturer, California State Polytechnic College, San Luis Obispo; placement interviewer and financial aid adviser, California State Polytechnic College, San Luis Obispo.

QUICK, LILLIAN F. (1972).....Graduate Nurse
R.N., St. John's Episcopal Hospital, 1959.

Experience: Head nurse, St. John's Episcopal Hospital; evening charge nurse, Washington Hospital Center; general duty nurse, Nyack Hospital, New York, and Ramapo General Hospital, Spring Valley, New York; supervisor, Out Patient Department, Children's Hospital, Louisville, Kentucky; Peace Corps volunteer, India; general duty nurse, Arroyo Grande Community Hospital; part-time nurse, Health Center, California Polytechnic State University.

QUINLAN, CHARLES W. (1966).....Architecture
B.Arch., Cornell University, 1959.

Experience: Private practice, urban planning and architecture; instructor, University of New Mexico; registered architect, California; NCARB certified.

RABE, PETER (1967).....Psychology
B.A., Ohio State University, 1943; M.A., Western Reserve University, 1948; Ph.D., 1949.

Experience: Self-employed psychological counseling, therapy, writer; research fellow, Jackson Laboratory, Bar Harbor, Maine; lecturer, Western Reserve University.

Faculty and Staff

- RADEMAKER, PIERRE (1972)** Art
 B.A., California State College, Long Beach, 1970.
 Experience: Art director and production manager, The Sunshine Studio; assistant art director, Martin Advertising and Public Relations; graduate assistant, California State College, Long Beach; instructor, Serra High School; recreation graphic specialist, County of Los Angeles Parks and Recreation Department, City of Lawndale; free-lance publication designer, graphic designer, and illustrator.
- RAPP, JOHN B. (1959)** Electronic and Electrical Engineering
 B.S., University of California, 1940; B.D., Princeton Theological Seminary, 1948; M.S., San Jose State College, 1967.
 Experience: Design engineer, General Electric Company; project engineer, Collins Radio Company; field engineer, United Fruit Company; instructor, Princeton University. Registered professional engineer, California.
- RATCLIFFE, RONALD V. (1963)** Music
 B.A., University of Washington, 1956; M.M., University of Southern California, 1958.
 Experience: Piano teacher; assistant professor, The College of the Ozarks; music director, Music-Go-Round Theater; buyer, The Boeing Company.
- RATHBUN, LARRY P. (1970)** Agricultural Education
 B.S., California State Polytechnic College, San Luis Obispo, 1964; M.A., 1967.
 Experience: Director of agriculture, Rio Vista High School; director of agriculture, coordinator of vocational education, coordinator of Manpower Development Act, Los Banos High School; evening instructor, Modesto Junior College and Merced College.
- REA, JOHN B. (1969)** Art
 B.F.A., University of Illinois, 1963; M.F.A., Rochester Institute of Technology, School for American Craftsman, 1965.
 Experience: Self-employed silversmith; instructor, Colorado State University; graduate instructor, Rochester Institute of Technology.
- REAGAN, EVELYN D. (1946-48) (1954)** Library
 B.S., College of St. Catherine, 1943.
 Experience: Librarian, College of the Holy Cross, Worcester, Massachusetts; librarian, Charity Hospital School of Nursing, New Orleans; cataloger, California State Polytechnic College.
- REIF, GARY D. (1967)** Dairy and Poultry Science
 B.S., Kansas State University, 1962; M.S., University of Nebraska, 1964; Ph.D., Iowa State University, 1967.
 Experience: Research assistant, University of Nebraska; research and teaching assistantship, director of dairy and food products analysis laboratory, Iowa State University.
- REMUND, CLIVE O. (1946)** Agricultural Engineering
 B.S., Utah State Agricultural College, 1931.
 Experience: Teacher, Utah high schools; agricultural instructor and critic teacher, California high schools.
- REYNOLDS, GERALD D. (1969)** Associate, Placement & Financial Aids
 B.S., California State Polytechnic College, 1963; M.A., 1970.
 Experience: Manufacturers representative, Mead-Johnson Nutritionals; territory sales representative, Home Garden Division, Ferry-Morse Seed Company; company representative, Canned Milk Division, Carnation Company; Student Affairs Internship, California State Polytechnic College; training officer, U.S. Coast Guard Reserve.
- REYNOLDS, ROBERT G. (1963)** Architecture
 B.P.A., Art Center College of Design, Los Angeles, 1962; M.A., California Polytechnic State University, San Luis Obispo, 1970.
 Experience: Artist, Creative Arts Studio, San Luis Obispo; free-lance illustrator-painter, Los Angeles and San Luis Obispo; art instructor, San Luis Obispo Adult School and Cuesta College; staff artist, production coordinator, California Polytechnic State University, San Luis Obispo.

REYNOLDS, R. WALLACE (1953).....Engineering Technology
B.S., California (Pa.) State Teachers College, 1940; M.S., Purdue University, 1946; additional graduate study, University of Pittsburgh, University of Southern California, University of California, Berkeley.

Experience: Assistant educational adviser, Civilian Conservation Corps; weight engineer, Douglas Aircraft Company; ordnance engineer, Naval Ordnance Laboratory; instructor, Purdue University; head, engineering drawing, Washington and Jefferson College; assistant professor, University of Santa Clara; professor and head, Engineering Graphics, West Coast University, University of California at Los Angeles, part-time; engineering designer, Hughes Aircraft Company; consulting work in tool design and machine design; owner-manager, R. W. Reynolds Drafting Service, San Luis Obispo.

REYNOLDS, WINIFRED (1968).....Child Development
B.A., Ohio State University, 1931; M.S., 1934.

Experience: Graduate assistant, Ohio State University; head teacher, Neighborhood Settlement House, Detroit; instructor in child development and head nursery school teacher, University of Tennessee; assistant professor and director of nursery school, San Jose State College, Texas Woman's University; associate professor of child development and director of nursery school, Colorado State University.

RHOADS, HOWARD (1956).....Crop Science
B.S., Montana State College, 1951; M.S., 1952.

Experience: Fieldman, Great Western Sugar Co., Billings, Montana; instructor and assistant, Montana State College.

RICE, WALTER E. (1964).....Economics
B.A., San Francisco State College, 1960; M.A., 1963; M.A., Claremont Graduate School, 1970; Ph.D., 1973.

Experience: Assistant floor manager, Roos/Atkins; student teacher, College of San Mateo; tutor, San Francisco; instructor, California State Polytechnic College, Kellogg-Voorhis.

RICH, GLENN W. (1953).....Agricultural Engineering
B.S., California State Polytechnic College, 1953; M.A., 1961.

Experience: Journeyman carpenter, U.S. Coast Guard; instructor, California State Polytechnic College.

RICHARDS, THOMAS L. (1969).....Biological Sciences
B.S., California State College, Long Beach, 1964; M.A., 1966; Ph.D., University of Maine, 1969.

Experience: Technical and research assistant, California State College, Long Beach; research assistant, NDEA fellow, Ira C. Darling Marine Laboratory, Walpole, Maine.

RICKARD, HERMAN E. (1959-68) (1969).....Dairy and Poultry Science
B.S., Ohio State University, 1950; M.S., 1954; Ph.D., 1958.

Experience: Assistant Herdsman, research assistant, in charge of federal dairy breeding program, Ohio State University. Dairy Department, California State Polytechnic College, San Luis Obispo; Extension Dairy Specialist, Ohio State University.

RIDER, ROL W., JR. (1960).....Business Administration
B.A., University of California, 1941; M.A., 1967; Ph.D., University of Oregon, 1972.

Experience: U.S. Naval Aviation (Reserve); Flight operations and airport management, Pan American Airways; National Sales Manager, Royal Rinse, Inc.; Divisional Product-Advertising Manager, Carnation Co., Inc.; Account Executive, N. W. Ayer & Son, Inc.; Account Supervisor, Young & Rubicam, Inc.; Management and Marketing Consultant.

RIEDLSPERGER, MAX E. (1969).....History
A.B., Wabash College, 1959; M.A., University of Michigan, 1961; Ph.D., University of Colorado, 1969.

Experience: Teacher, Eastern High School, Bay de Noc Community College; teaching associate, University of Colorado; instructor, Temple Buell College; Fulbright Scholar, University of Salzburg.

Faculty and Staff

RIGGINS, RHONDA L. (1972) Biological Sciences
B.S., Austin Peay State College, Tennessee, 1966; M.S., Iowa State University, 1969; Ph.D., 1972.

Experience: Teaching assistant, Iowa State University.

RIHAL, SATWANT S. (1969) Architecture
B.S., University of Delhi, India, 1961; M.S., University of Minnesota, 1964; Ph.D., University of New Mexico, 1969.

Experience: Civil engineer, Central Water and Power Commission, New Delhi; structural engineer, T. T. Burnett Engineering Inc., Albuquerque, New Mexico; instructor, Department of Civil Engineering, Univ. of New Mexico; structural engineer, Pre-Stressed Concrete Products, Inc., Albuquerque; consultant, Hydro-Conduit Corporation, Albuquerque, New Mexico; structural engineer, Benito A. Sinclair and Associates, Los Angeles.

RITSCHARD, RONALD L. (1965) Biological Sciences
B.S., California State Polytechnic College, 1961; M.S., Oregon State University, 1964; Ph.D., 1966.

Experience: Teaching and research assistant, Oregon State University; National Science Foundation Fellow, University of Massachusetts; Atomic Energy Commission Fellow, University of Kansas.

RITTENHOUSE, EUGENE A. (1949) Director, Placement
B.S., University of California, Los Angeles, 1947; M.B.A., University of California, Berkeley, 1948; additional graduate study, University of California, Berkeley.

Experience: Bookkeeper, J. J. Elmore Company, Brawley; broker's clerk, Dean Witter & Co., Los Angeles; purchasing, War Department, USAAF, Trinidad, B.W.I.; U.S. Navy; instructor, social sciences; administrative assistant for personnel, office of the president, California State Polytechnic College.

ROACH, DAVID M. (1966) Physics
B.S., South Dakota School of Mines and Technology, 1961; M.S., 1963.

Experience: Graduate assistant, instructor, South Dakota School of Mines and Technology; instructor, Wisconsin State University, Northrop Institute of Technology; engineer, Leach Corporation.

ROBERTS, ALICE E. (1963) Education
B.S., Milwaukee State Teachers College, 1940; M.S., University of Wisconsin, 1962; additional graduate study, University of California, Los Angeles, University of California, Santa Barbara, Temple University, Stanford University, University of Northern Colorado.

Experience: Elementary school teacher, West Bend, Wisconsin; participant in Wisconsin Education Improvement Program; leader in team teaching and intern program.

ROCHA, ELPIDIO (1972) Architecture
B.S., Kansas State University, 1951.

Experience: Structural engineer, City of Kansas City; designer/draftsman, Harrington & Cortelyou, Bridge Engineers, Kansas City; architect/engineer, Park Department of Kansas City; owner, Elpidio Rocha Associates, Kansas City; consultant, Planning Department, Kansas City; visiting critic, University of Kansas; instructor, Kansas City Art Institute and School of Design; visiting critic, Industrial Design Department and Sculpture Department; director, Environmental Design Workshop; environmental planner and design coordinator, Urban Renewal Agency, Kansas City. Registered architect and registered engineer.

- RODIN, ROBERT J. (1953)** Biological Sciences
 A.B., University of California, 1943; Ph.D., 1951.
 Experience: Assistant botanist, University of California Herbarium; ranger naturalist, Yosemite National Park; administrative clerk, U.S. Marine Corps; expedition botanist, University of California African Expedition; teaching assistant, University of California; lecturer for extension division, University of California; professor of biology, Forman Christian College, Lahore, Pakistan; visiting assistant professor, University of California, Santa Barbara; lecturer, National Science Foundation Summer Science Program; visiting assistant professor and National Science Foundation fellow, Cornell University, New York; Fullbright professor, University of Delhi, India; consultant, National Registered Landmark Program, U.S. National Park Service; visiting professor, Oregon State University, Corvallis.
- ROEST, ARYAN I. (1955)** Biological Sciences
 B.S., University of Virginia, 1945; B.S., Oregon State College, 1948; M.S., 1949; Ph.D., 1954.
 Experience: Officer, U.S. Navy; teaching and research assistant, Oregon State College; assistant professor, Central Oregon College; forester, Oregon State Board of Forestry; lecturer, Extension Division, University of California; visiting assistant professor, University of California, Santa Barbara; lecturer, National Science Foundation Summer Science Program.
- ROGALLA, JOHN A. (1959)** Agricultural Management
 B.S., California State Polytechnic College, 1956; M.S., Cornell University, 1958; Ph.D., Cornell University, 1968.
 Experience: Teaching and research assistant, Department of Agricultural Economics, Cornell University; farm management consultant; material control analyst, Ryan Aeronautical Company; U.S. Air Force.
- ROGERS, JOHN M. (1970)** Computer Science & Statistics
 B.S., Marion College, 1962; M.S., Kansas State University, 1966; additional graduate study, Virginia Polytechnic Institute.
 Experience: Teacher, Jefferson Township High School; teacher, Army Education Center, Fort Riley, Kansas; graduate teaching assistant, Kansas State University; lecturer, California State Polytechnic College, San Luis Obispo.
- ROGERS, LEO E. (1954)** Engineering Technology
 B.S., California State Polytechnic College, 1950.
 Experience: Instructor, San Luis Obispo High School; designer, Division of Highways, San Luis Obispo.
- ROHNER, J. WELDON (1964)** Business Administration
 B.A., Arizona State College, 1934; graduate study, University of Utah, Arizona State College.
 Experience: Teaching fellow, University of Utah; accountant, Rogers and Bailey; training supervisor, Standard Oil of New Jersey; special agent, Federal Bureau of Investigation.
- ROLLINGS, DAVID R. (1968)** English
 A.B., University of Louisville, 1948; M.A., University of Michigan, 1949; additional graduate study.
 Experience: Assistant professor, Eastern Michigan University, Wisconsin State University, University of Puerto Rico, East Kentucky State College, Wisconsin State College.
- ROMNEY, JOSEPH B. (1969)** History
 B.S., University of Utah; J.D., 1963; M.A., 1967; Ph.D., 1969.
 Experience: Musician, Utah Symphony Orchestra; research clerk, Utah Supreme Court; assistant, Utah State Attorney General; lawyer, Romney & Boyer; teaching assistant, University of Utah.
- ROSE, VICTORY A. (1971)** History
 B.A., University of California, Los Angeles, 1966; M.A., 1968; additional graduate study.
 Experience: Assistant professor, California State Polytechnic College, Pomona; probation officer, Los Angeles County Probation Department.

Faculty and Staff

- ROSEN, ARTHUR Z. (1953)** Physics
 A.B., University of California, 1941; Ph.D., 1952.
 Experience: Physicist, University of California Radiation Laboratory; U.S. Navy; teaching and research assistant, University of California; lecturer, University of California, Santa Barbara College.
- ROSENBERG, ROBERT L. (1970)** History
 B.A., Stanford University, 1944; M.A., University of Washington, 1964; Ph.D., University of Washington, 1971.
 Experience: Lecturer, supervisor of student teaching, University of Washington; teacher, Bellevue Community College, Washington, Highline Senior High School, Washington; instructor, U.S.A.R. and Provost Marshal, 42d Infantry Division, Salzburg, Austria.
- ROSENMANN, MONA G. (1971)** English
 B.A., University of Michigan, 1955; M.A., Case-Western Reserve University, 1960; Ph.D., Kent State University, 1970.
 Experience: Teacher, Independence, Ohio, Winchester, Massachusetts, Beachwood, Ohio; teaching fellow, Kent State University.
- ROSENTHAL, BIANCA (1971)** Foreign Languages
 B.S., University of Washington, 1952; M.A., 1966; Ph.D., 1970.
 Experience: Teacher, Federal Way Senior High School, Washington; predoctoral associate; research assistant, University of Washington; instructor, Lake Washington Continuing Education; medical technologist, private physician's office and Providence Hospital.
- ROSKE, MILDRED E. (1967)** Home Economics
 B.A., University of California, 1955; M.A., 1958.
 Experience: Interior designer, Sherman Oaks; teaching assistant, instructor, University of California; teacher, adult education, Los Angeles City Schools; instructor, Rochester Institute of Technology; teacher, Oxnard Evening School.
- RUGGLES, PHILIP K. (1966-67) (1971)** Graphic Communications
 B.S., West Virginia Institute of Technology, 1965; M.S., South Dakota State University, 1966.
 Experience: Chairman, Printing Management Technology, Columbus Technical Institute, consultant for printing industry of Central, Ohio; instructor, Arkansas State University; graduate teaching assistant, South Dakota State University.
- RUSSELL, CHARLES R. (1968)** Mechanical Engineering
 B.S., Washington State College, 1936; M.S., California Institute of Technology, 1946; Ph.D., University of Wisconsin, 1941.
 Experience: Section head, General Motors Corp., U.S. Atomic Energy Commission; program administrator, Navy Bureau of Ordnance; engineer, Procter and Gamble, Dow Chemical. Registered professional engineer, California, Michigan, Virginia, and District of Columbia.
- RUSSELL, JOHN G. (1968)** Music
 A.B., Fresno State College, 1959; M.A., Chico State College, 1968.
 Experience: Instructor, Fresno State College; teacher, Laton Union High School, Chico Senior High School; assistant professor, Chico State College.
- SAAM, PATRICIA (1966)** Home Economics
 B.S., College of St. Catherine, St. Paul, Minnesota, 1950; M.S., California Polytechnic State University, 1973.
 Experience: Dietetic internship, research-pediatrics dietitian, University of Minnesota; head dietitian, Paso Robles War Memorial Hospital, Sierra Vista Hospital; dietitian, dining hall, California Polytechnic State University.
- SABOL, JOSEPH E. (1972)** Agricultural Education
 B.S., Fresno State College, 1963; M.Ed., University of California, 1965.
 Experience: Instructor, Vocational Agriculture, Orestimba Union High School, Newman; instructor, Agricultural Sciences, Mount San Antonio College, Walnut, California.

- SABTO, JACOB (1968)**.....Electronic and Electrical Engineering
B.E.E., Cairo University, 1948; Ingenieur Radio-ESE, Ecole Supérieure D'Electricité, Paris, 1951; E.E., Columbia University, 1959; additional graduate study, New York University.
Experience: Lecturer, City College of New York and Institute of Technology, Hoboken, New Jersey; Adjunct Professor, Newark College of Engineering; development engineer, I.T.T., Nutley, New Jersey; technical staff, Bell Telephone Laboratories, Holmdel, New Jersey.
- SALO, GLENN W. (1955)**.....Agricultural Engineering
B.S., Montana State College, 1950; M.S., University of Idaho, 1955.
Experience: Shops officer, U.S. Air Force; instructor and assistant agricultural engineer, University of Idaho; Research Fellow, University of Idaho.
- SANCHEZ, DAVID J. (1970)**.....Head, Ethnic Studies Department
B.B.A., University of Texas at El Paso, 1950; graduate study, University of California, Santa Barbara.
Experience: Junior high teacher, Tornillo, Texas; insurance agent; teacher, Lucia Mar Unified School District, Pismo Beach; part-time lecturer, California State Polytechnic College, San Luis Obispo.
- SANCHEZ, RICHARD M. (1972)**.....Education
B.S., Northern Arizona University, 1964; M.A., California Polytechnic State University, 1971; Ed.D., Western Michigan University, 1972.
Experience: Elementary and junior high school teacher, San Luis Obispo Coastal Unified School District and Rialto Unified School District; educationally handicapped teacher, San Luis Obispo Coastal Unified School District; Charles Stewart Mott Doctoral fellow; consultant, cross-cultural education.
- SANDERSON, JAMES D. (1967)**.....Men's Physical Education
A.B., Fresno State College, 1962; M.S., California State Polytechnic College, 1969.
Experience: Teacher and coach, Tulare Western High School, Tulare, and Sierra High School, Tollhouse.
- SANDLIN, DORAL R. (1969)**.....Aeronautical Engineering
B.S., U.S. Naval Academy, 1954; M.S., Air Force Institute of Technology; Ph.D., University of Arizona, 1972.
Experience: Flight test maintenance officer and pilot, U.S. Air Force; missile branch chief, Holloman Air Force Base, New Mexico; chief, aeromechanics branch, Flight Dynamics Laboratory, Wright-Patterson Air Force Base, Ohio.
- SANKOFF, LEO (1946)**.....Dairy and Poultry Science
B.S., California State Polytechnic College, 1942; M.A., 1956.
Experience: Agricultural instructor, Fillmore High School.
- SAVEKER, DAVID R. (1968)**.....Architecture
A.B., Stanford University, 1941; Certificate Naval Architecture, U.S. Naval Academy Post Graduate School, 1942; M.S., Naval Architecture & Marine Engineering, Massachusetts Institute of Technology, 1946; Certificate Naval Warfare, U.S. Naval War College, 1959; additional graduate study, California State Polytechnic College, 1968-69.
Experience: Engineering duty officer, officer in charge of Underwater Explosions Research Division, Norfolk Naval Shipyard, nuclear test program officer, new construction and ship repair, Puget Sound Naval Shipyard; Pacific Fleet Staff; officer in charge, Naval Engineering Curricula, Naval Post Graduate School, Monterey; senior management and command duties, U.S. Navy.
- SCALES, HARRY H. (1958)**.....Education
B.A., Arizona State College, 1934; M.A., Stanford University, 1939; Ed.D., 1950.
Experience: Teacher and counselor, Santa Barbara Junior College; associate professor and consultant to industry and schools, Michigan State University; aerial navigation training, U.S. Navy; teacher and guidance director, Redlands High School; director of research, Arizona State Department of Education; teacher, Superior and Safford, Arizona, public schools.

Faculty and Staff

SCHAFFNER, DAVID J. (1972).....Agricultural Management
B.S., University of California, Davis, 1964; M.B.A., University of California, Berkeley, 1970.

SCHEFFER, PAUL E. (1964).....Industrial Engineering
B.M.E., University of Minnesota, 1947; M.S., University of Southern California, 1959.

Experience: Chief industrial engineer, Crane Company; senior industrial engineer, U.S. Rubber Company; engineer, Appraisal Service Company; instructor, University of Minnesota. Registered professional engineer, California.

SCHLEICHER, HELMUT L. (1970).....Architecture
B.A., Kaiser-Friedrich City College, Germany, 1936; M.S., Institute of Technology, Munich, Germany, 1945; Ph.D., University of Munich, Germany, 1948; additional graduate study, University of Hawaii.

Experience: Chief planner and associate, Kaiser Engineers International, Oakland; Vice Pres./General Manager, Allied Pacific & W&F Mech. Contract., Hawaii; manager, mechanical division, Alliance Companies, Los Angeles & Hawaii; project engineer, Dillingham Corp./Haw Dredging & Construction, Hawaii; construction superintendent, various firms in California. Registered Industrial Consultant, Germany; licensed general and mechanical contractor, Hawaii.

SCHROEDER, WALTER P. (1957).....Head, Education Department
B.S., Michigan State University, 1940; M.A., 1947; Ph.D., 1953.

Experience: Three years technical and management work in agriculture, business and industry; teacher, supervising teacher, and administrator in junior and senior high schools and unified districts, assistant professor, vocational education and education, Michigan State University; assistant placement director, Michigan State University.

SCHWARTZ, KENNETH E. (1952).....Director, School of Architecture
and Environmental Design
B. Arch., University of Southern California, 1952; graduate study, Pennsylvania State, Rensselaer Polytechnic Institute, University of Manchester.

Experience: Draftsman, Douglas Aircraft Company; draftsman-designer, various Los Angeles architectural firms; private practice, San Luis Obispo; San Luis Obispo Planning Commission; Mayor, San Luis Obispo. Registered architect, California.

SCOTT, CHESTER H. (1952).....Mathematics
B.A., Municipal University of Wichita, 1938; electronics diploma, U.S. Navy, 1945; M.S., Montana State College, 1950; additional graduate study, Stanford University.

Experience: Instructor, Sheridan High School, Wyoming; instructor, mathematics and navigation, Civilian Pilot Training School; counselor, Y.M.C.A.; instructor, mathematics, electronics, U.S. Navy; assistant professor, mathematics; Montana School of Mines; statewide counselor, University of Montana.

SCOTT, JACK F. (1967).....Agricultural Management
B.S., California State Polytechnic College, 1961; M.A., 1967.
Experience: Director of Vocational Agriculture, Galt Joint Union High School, Galt.

SCOTT, PAULA ROSEMARY (1973).....Library
B.A., University of California, Los Angeles, 1965; M.L.S., University of California, Los Angeles, 1966; graduate study, Monterey Institute of Foreign Studies.

Experience: Serials-Reference librarian, Biomedical Library, University of California, Los Angeles; reference librarian, University of California, Santa Cruz; translator, Joint Publications Research Service, San Francisco.

SCOTTO, KENNETH C. (1970).....Animal Science
B.S., California State Polytechnic College, San Luis Obispo, 1966; M.S., University of Nevada, 1969.

Experience: Instructor, University of Nevada, Reno; graduate research assistant, University of Nevada; ranch and farming operations, California.

- SEABERG, DUANE O. (1965)**.....Agricultural Management
B.S., California State Polytechnic College, 1960; M.A., 1963.
Experience: Farming; instructor, Ferndale Union High School.
- SEAMAN, LEONARD R. (1972)**.....Business Administration
A.B., University of California, Berkeley, 1932; J.D., 1936.
Experience: General law practice; West Coast Division Manager, The British-American Oil Producing Company; president, Intex Oil Company; instructor, Bakersfield College, Bakersfield, California.
- SEEBER, GLENN E. (1954)**.....Engineering Technology
A.B., 1949; M.A., 1950, Chico State College.
Experience: Instructor in biology and welding, Lassen Union High School and Junior College; welder and foreman, Interstate Steel Co., Chico; welder, Anderson's Welding Shop, Chico; welder and foreman, Pollock Shipbuilding Corp., Stockton; locomotive fireman, Western Pacific Railroad.
- SENNETT, ROBERT EARL (1970)**.....Aeronautical Engineering
B.S., University of Pennsylvania, Philadelphia, 1959; M.S., 1961; Ph.D., 1963.
Experience: Assistant professor, University of California, Santa Barbara; senior structural dynamicist, General Motors Defense Research Laboratories, Santa Barbara; assistant instructor-teaching fellow, University of Pennsylvania; research engineer, Dyna/Structures, Inc., Springfield, Pennsylvania.
- SERVATIUS, OWEN L. (1947)**.....Head, Business Administration Department
B.S., California State Polytechnic College, 1959; M.A., 1964.
Experience: Brokers' clerk, Baker-Fentress & Co., Chicago, Illinois; U.S. Navy; supervising clerk, California State Polytechnic College.
- SETTLE, ALLEN K. (1970)**.....Political Science
B.A., University of California, Santa Barbara, 1966; M.A., 1967; Ph.D., 1970.
Experience: Instructor, Santa Barbara City College; intern-fellow, American Political Science Association; research assistant, University of California, Santa Barbara.
- SEVIER, BARBARA (1969)**.....Women's Physical Education
B.A., San Jose State College, 1949; M.A., Columbia University, 1952; Ph.D., University of Utah, 1969.
Experience: Instructor and acting chairman, women's physical education, California Western University; instructor, Monterey Peninsula College; instructor and head, girl's physical education, Armijo Union High School, Fairfield; instructor, girl's physical education, Porterville Union High School.
- SHAH, RAMESH T. (1969)**.....Mechanical Engineering
B.E., Maharaja Sayajirao University of Baroda, India; Dr. Ing., Hochschule Fur Schwermaschinenbau, Magdeburg, Germany, 1959.
Experience: Professor, reader, lecturer, and demonstrator, Faculty of Technology and Engineering, University of Baroda, Baroda, India.
- SHAW, MARY E. (1963)**.....Associate Director, Placement
B.S., Texas Women's University, 1941.
Experience: Service representative, Pacific Telephone, San Luis Obispo; social worker, San Luis Obispo County Welfare Department; receptionist, intermediate clerk, placement interviewer, placement supervisor, California State Polytechnic College.
- SHEIK, HABIB (1967)**.....English
B.S., Fresno State College, 1959; A.B., 1960; M.A., California State Polytechnic College, 1961; M.A., University of California at Los Angeles, 1966; additional graduate study, University of Nebraska.
Experience: English tutor, project "Upward Bound," University of California; instructor, Vietnamese Leadership/Scholarship Program, California State Polytechnic College.

Faculty and Staff

- SHELTON, DONALD L. (1973)** Director, Personnel Relations
B.G.E., University of Omaha, 1958; B.S., University of Southern California, 1960; M.S., 1960.
Experience: Director of personnel, air force bases in Spain, Louisiana, Japan, California; chief of officer assignments, Strategic Air Command, Omaha; professor of aerospace studies, Loyola University, Los Angeles; director of officer personnel, Headquarters Air University, U.S. Air Force; principal personnel analyst, The California State University and Colleges.
- SHIRK, CARL D. (1968)** Medical Officer
B.S., University of California, Berkeley; M.D., University of California Medical Center, San Francisco, 1961.
Experience: Internship, San Diego County Hospital; residency, Stanislaus County Hospital; general practice, Oakdale, California.
- SHRODE, L. IRENE (1965)** Graduate Nurse
R.N., Knapp College of Nursing, Santa Barbara.
Experience: Warren State Hospital, Warren, Pennsylvania; Sierra Vista Hospital, San Luis Obispo.
- SILVER, GORDON A. (1964)** Physics
B.S., University of California, Los Angeles, 1959; M.S., 1961; additional study, University of California, Berkeley.
Experience: Instructor, American Television Labs, Los Angeles Valley College; research engineer, Electrosonic Systems, Inc.; associate investigator, Children's Hospital, Los Angeles, California.
- SIMMONS, JAMES E. (1966)** English
B.A., University of California, Santa Barbara, 1959; M.A., University of Wisconsin, 1960; Ph.D., 1966.
Experience: Assistant professor, Wisconsin State University; associate dean, School of Applied Arts, California Polytechnic State University.
- SIMMONS, ORIEN W. (1961)** Metallurgical Engineering
B.S.E., University of Michigan, 1935; M.S.E., 1948.
Experience: Metallurgist, Carnegie-Illinois Steel Company; Packard Motor Car Company; instructor, Rose Polytechnic Institute; officer U.S. Navy; research engineer, Battelle Memorial Institute; senior research engineer, Frankford Arsenal; Rem Cru Titanium Company and Crucible Steel Company; Climax Molybdenum Company; registered professional engineer, Ohio and California.
- SIMMONS, STEVAN M. (1970)** Men's Physical Education
B.A., Chapman College, 1965; graduate work, California State College at Los Angeles.
Experience: Security officer, Disneyland; assistant track coach, Chapman College; teacher and co-chairman, Boys Physical Education, Bret Harte Junior High School, Los Angeles.
- SIMS, DONALD R., MAJ. (1972)** Military Science
B.S., Tuskegee Institute, 1959; Infantry Officer's Basic Course, 1960; Airborne School, 1960; Infantry Officer's Advanced Course, 1968; Defense Language Institute (Vietnamese), 1968.
Experience: Company commander and intelligence officer, U.S. Army, Europe; company commander, U.S. Army, Vietnam; assistant operations officer and battalion executive officer, 4th Infantry Division, Fort Carson.
- SMITH, HOWARD F. (1968)** Economics
A.B., Wayne State University, 1940; M.B.A., Harvard University, 1942; M.A., American University, 1952; Ph.D., American University, 1963.
Experience: Economist, War Production Board; economic advisor, supreme commander for Allied Powers, Tokyo and Okinawa; international economist, Department of State; foreign service officer, Thailand, Ceylon, Congo; member of Presidential Study Mission to Korea; deputy director, U.S. Aid Mission, Congo; coordinator, U.S. Aid to Africa; director, Ghana Aid Program; officer, U.S. Army.

- SMITH, J. MURRAY (1960) Speech Communication
 B.A., University of Denver, 1940; M.A., 1947.
 Experience: Instructor in English and speech, Denver University, Michigan State University and Wichita University; technical director, Denver Civic Theater; president, The Knitter Company (mfg.), Denver; staff director, Pasadena Playhouse; officer, U.S. Marine Corps.
- SMITH, M. EUGENE (1946) History
 A.B., University of California, 1934; M.A., 1937; Ed.D., University of Oregon, 1958; additional graduate study, University of California, University of Hawaii.
 Experience: Teacher, Piedmont High School; graduate assistant, Universities of California and Oregon; instructor, Military Intelligence Language School, U.S. Army.
- SMITH, NELSON L., III (1962) Industrial Technology
 B.S., Lowell Technological Institute, 1960; M.S., 1962; additional graduate study, University of Iowa.
 Experience: Senior systems analyst, quality control engineer, Raytheon Company, Lowell, Massachusetts.
- SMITH, R. ELBERTON (1970) Economics
 B.A., College of Wooster, Ohio, 1935; M.A., University of Chicago, 1946; Ph.D., 1947.
 Experience: Program economist, USAID Mission to Turkey; program economist and commodity import advisor, U.S. Mission to Cambodia; program economist, ICA Mission to Japan, economic advisor to Japan Productivity Center; economic historian and author, Office of Military History, War Department and Department of the Army; officer, U.S. Navy; economist, War Production Board; visiting professor, Indiana University; lecturer, University of Maryland; professor, Northwestern University; instructor, University of Denver; branch manager, B. B. Kirkbride Bible Company; divisions expert, Elgin, Joliet and Eastern Railway.
- SNETSINGER, JOHN G. (1970) History
 A.B., University of California, Los Angeles, 1963; M.A., University of California, Berkeley, 1966; Ph.D., Stanford University, 1969; additional graduate study, Stanford School of Law.
 Experience: Teaching assistant, graduate assistant, Stanford University; instructor, San Jose State College.
- SORENSEN, L. ROBERT (1966) Head, Psychology Department
 B.A., Pomona College, 1948; M.A., Claremont Graduate School, 1951; Ph.D., 1966.
 Experience: Assistant to dean of students, Pomona College; lecturer, assistant director Industrial Relations Center, administrative assistant Jet Propulsion Lab, and associate director of development, California Institute of Technology; assistant in development, assistant dean, Claremont Graduate School.
- SPARLING, SHIRLEY R. (1963) Biological Sciences
 B.S., Iowa State College, 1950; M.S., 1951; Ph.D., University of California, 1956; additional graduate study, University of Michigan, Stanford University.
 Experience: Instructor, Central College; lecturer and instructor, University of British Columbia; instructor and assistant professor, University of California at Santa Barbara; University of Oregon Institute of Marine Biology.
- SPENCER, RUTH G. (1967) Library
 B.A., Milwaukee-Downer College, 1938; B.L.S., University Library of Chicago, 1945; additional graduate study, University of Wisconsin.
 Experience: Cataloger and reference librarian, Milwaukee Public Library; librarian, U.S. Public Health Service, Cincinnati; cataloger, Northrop Aircraft; reference librarian, Los Angeles Public Library.

Faculty and Staff

STAHL, VERLAN H. (1968) Foreign Languages
B.A., College of the Pacific, 1950; M.A., Florida State University, 1955; Ph.D., University of Madrid, 1969.

Experience: American program officer, Fulbright Commission and in-service English teacher, Standard Electric Co., Madrid; instructor, Wake Forest College, Winston-Salem; teaching assistant, Florida State University; secretary to Vice President, W. B. Camp & Sons, Inc., Bakersfield.

STALLARD, MARY L. (1965) Women's Physical Education
B.A., Fresno State College, 1957; M.S., University of Washington, 1965.

Experience: Instructor, Hamilton Junior High, Fresno; teaching assistant, University of Washington.

STANSFIELD, WILLIAM D. (1963) Biological Sciences
B.S., California State Polytechnic College, 1953; M.A., 1959; M.S., University of California, Davis, 1962; Ph.D., 1963.

Experience: Cadet teacher, Chaffey Union High; line officer, U.S. Naval Reserve; vocational agriculture teacher, Fortuna Union High School; teaching assistant and research assistant, University of California.

STEARNS, JOSEPHINE S. (1969) Child Development
B.S., University of New Hampshire, 1958; M.A., Michigan State University, 1969.

Experience: Nursery school teacher, Lansing, Michigan; associate 4-H Youth Development Agent, Milford, N.H.; utility demonstrator, Malden, Massachusetts.

STECHMAN, JOHN V. (1960) Animal Science
B.S., University of California, Davis, 1957; M.S., 1960.

Experience: Range aid, U.S.D.A. Forest Service, Agricultural Research Service; research assistant, University of California, Davis; biological assistant, U.S. Army; range consultant, State of California, Modoc County, Kern County, and private industry.

STEELE, F. RAYMOND, JR. (1968) Food Industries
B.A., California State Polytechnic College, 1956; M.S., Cornell University, 1967; Ph.D., 1968.

Experience: Teaching assistant, University of Southern California; division manager, Sears Roebuck and Co.; brewer, Pabst Brewing; instructor, California State Polytechnic College; participant, Academic Year Institute, radiation biology, and research assistant, Department of Food Science, Cornell University; naval aviator, U.S.N.R.

STEINBERG, HOWARD (1970) Mathematics
B.M.E., City College of New York, 1950; M.S. New York University Graduate School, 1966; Ph.D., 1969.

Experience: Manager of Missile Equipment and Ordinance Department, Maxson Electronics Corp.; manager mechanics program, Kollsman Instrument Corp.; engineering and mathematical consultant; assistant professor, Mathematics Research Center, University of Wisconsin.

STEUCK, FRED H. (1947) Electronic and Electrical Engineering
B.S., Iowa State College, 1937.

Experience: Engineer, Nebraska Power Co.; manager, O'Brien Co.; Rural Electric Co-op., Iowa; instructor, Iowa State College; officer, U.S. Navy; registered professional engineer, California.

STOFFEL, EDWARD O. (1957) Mechanical Engineering
B.M.E., University of Santa Clara, 1950; M.E., University of Santa Clara, 1955; M.S.M.E., Oregon State University, 1968.

Experience: Engineer, Autonetics, Aerojet-General, Northrup Aircraft; Robertshaw-Fulton Controls, Norris-Thermador Corp.; chemist, U.S. Industrial Chemicals; registered professional engineer, California.

- STONEBACK, TERESA J. (1972)**.....Child Development
B.S., Kansas State University, 1970; M.S., 1972.
Experience: Graduate teaching assistant and assistant instructor, Kansas State University.
- STOOKEY, ELLEN T. (1961)**.....Home Economics
B.S., University of Illinois, 1943; M.A., 1950; additional graduate study, Stanford University.
Experience: Elementary teacher, Illinois; vocational home economics teacher, Illinois; supervising teacher, University of Illinois; teacher trainer, University of Illinois; special service, U.S. Army Air Force; regional supervisor, Bureau of Home-making Education, California State Department of Education.
- STRASSER, J. EDWARD (1960)**.....Industrial Technology
B.S., California State Polytechnic College, 1958; M.B.A., Golden Gate College, 1967.
Experience: Construction mechanic, Pacific Electric Company, Anchorage, Alaska; machinist, MEFCO Mfg., Glendale; draftsman, I.D.S., Inc., Glendale; tool and die maker, Arrowsmith Tool & Die Corp., Los Angeles; sales engineer, O'Brien Machinery, Inc., Los Angeles; control systems analyst, the Boeing Company, Seattle; installation manager, Western Electric.
- STRAUSS, L. HARRY (1961)**.....Director, College Library
B.S., George Williams College, 1935; M.A., Graduate Library School, University of Chicago, 1942; additional graduate study, University of Michigan.
Experience: Librarian, George Williams College; Chicago College of Osteopathy; Northwestern Michigan Junior College; instructor in audio-visual education, University of Oklahoma; audio-visual consultant, National Council of the Y.M.C.A.; executive secretary, Commission on Motion Pictures in Adult Education; superintendent of schools, Rapid City and Cedarville, Michigan.
- STREICHERT, GRETCHEN C. (1958)**.....Home Economics
B.S., Oregon State College, 1936; M.S., 1951.
Experience: Teacher, high schools; home adviser, University of California Agricultural Extension; nursery school supervisor and instructor, Oregon State College; instructor, Modesto Junior College; personnel field counselor, Oregon Shipbuilding Corporation; teacher-counselor, Oregon State School for Girls.
- STRICKMEIER, HENRY B. (1970)**.....Mathematics
B.S., Texas Luthern College, 1962; M.A., University of Texas, 1967; Ph.D., 1970.
Experience: Teacher, Galveston Independent School District; teaching assistant and teaching associate, University of Texas.
- STROHMAN, ROLLIN D. (1969)**.....Agricultural Engineering
B.S., University of Illinois, 1962; M.S., 1965; Ph.D., Purdue University, 1969.
Experience: Research Engineer, John Deere Company; Agricultural Engineer, USDA, ARS, WORDD.
- STRONG, CHARLES W. (1971)**.....English
B.S., Arizona State University, 1965; M.A., University of Missouri, 1969.
Experience: Supervisor, technical communication, Motorola Semiconductor Products, Inc.; instructor, University of Missouri; teacher, Judson Private School, Scottsdale, Arizona.
- STRUBLE, DONALD E. (1970)**.....Aeronautical Engineering
B.S., California State Polytechnic, 1964; M.S., Stanford University, 1967; Ph.D., Georgia Institute of Technology, Atlanta, Georgia, 1969.
Experience: Management trainee, Pacific Telephone and Telegraph Company; development engineer, draftsman, Aerojet-General Corporation.
- STUART, JOHN S. (1964)**.....Architecture
B. Arch., Texas Technological College, 1950; graduate study, Pennsylvania State University, MIT, California Polytechnic State University, San Luis Obispo.
Experience: Private practice, Schmidt & Stuart; designer and supervisor, Atcheson & Atkinson, Architects. Registered architect and registered engineer, Texas.

Faculty and Staff

- STUBBS, DANIEL F. (1963-66) (1968).....Head Computer Science
& Statistics Department
B.S., Purdue University, 1960; M.S., Rensselaer Polytechnic Institute, 1962; Ph.D.,
1973.
Experience: Teaching assistant, Purdue University; engineer, Knolls Atomic
Power Laboratory; instructor, California State Polytechnic College, San Luis
Obispo.
- SUCHAND, GEORGE J. (1971)Social Sciences
B.A., Louisiana State University, 1958; M.A.T., University of Florida, 1967;
additional graduate study, University of Oklahoma.
Experience: Assistant professor, Georgia Southwestern College; teaching assist-
ant, University of Oklahoma; map librarian, University of Florida; Lieutenant,
U.S. Navy.
- SUHR, MOON JA MINN (1969-71) (1972).....Women's Physical Education
B.S., Ewha Women's University, Seoul, Korea, 1963; M.A., Colorado State Col-
lege, 1969.
Experience: Dance instructor, Kong-Ju Teacher's College, Middle and High
School, King-Ju, Korea; dance instructor, Sook Myoung Girls' Middle High
School, Seoul, Korea; ballet instructor, Creative Art Center, Greeley, Colorado.
- SULLIVAN, GERALD J. (1968)English
B.A., University of Wichita, 1957; M.A., University of Oklahoma, 1959; Ph.D.,
1964.
Experience: Instructor, University of Wisconsin, University of Arizona; teach-
ing assistant, University of Oklahoma; assistant professor, University of North
Texas State.
- SUMMERS, MARY JO (1962)Graduate Nurse
R.N., University of Oregon, Eugene, 1939; B.S., 1939.
Experience: Los Angeles County Hospital.
- SWANSEN, VERN (1971)Architecture
B. Arch., University of Southern California, 1939; graduate study, University of
California, Santa Barbara.
Experience: Post arts director, Special Services, Fifth Army Headquarters; lec-
turer, Westmont College; instructor, Santa Barbara City College; curator of educa-
tion, Santa Barbara Museum of Art.
- SWANSON, CLIFTON E. (1967)Music
B.A., Pomona College, 1963; M.M., University of Texas, 1965; additional graduate
study, University of California.
Experience: Teaching assistant, University of Texas, University of California;
visiting assistant professor, Portland State College; member, Group for Contem-
porary Music, Portland.
- SWEET, MARY D. (1969)Philosophy
B.A., M.A., University of Missouri, 1963; Ph.D., 1969.
Experience: Instructor, Woodbury College; Northern Arizona University; assist-
ant instructor, University of Missouri.
- SZIGETHY, NICHOLAS (1961)Library
Ph.D., Erzebet University, Pecs, Hungary, 1940; M.L.S., Columbia University
Library School, 1958.
Experience: Columbia University School of Business Library; cataloger, Cornell
University Library; cataloger, University of Nevada Library.

- TALBOTT, LAURENCE F. (1966)** Industrial Technology
 A.B., San Diego State College, 1951; M.B.A., University of Southern California, 1965; Ed.D., Utah State University, 1972.
 Experience: Manager Test Quality Control, Rocketdyne; plant engineer, Space and Information Systems, Division North American Aviation, Inc.; chief facilities engineer, chief industrial engineer, plant engineer, Autonetics; electrical engineer, Convair, San Diego; C. F. Braun and Company, Alhambra; sales engineer, California Electric Works, San Diego, Registered professional engineer, California.
- TELLEW, FUAD H. (1960)** Head, Economics Department
 B.S., College of Commerce and Economics, Baghdad, Iraq, 1950; M.A., University of Southern California, 1954; Ph.D., 1959.
 Experience: Accountant, Engineering Department, Iraqi State Railways; supervisor, Testing Bureau, University of Southern California; teaching assistant and lecturer, University of Southern California.
- TERRY, RICHARD A., CPT. (1972)** Military Science
 B.S., Berry College, 1963; Officer Candidate School, 1967; Signal Officer Advance Course, 1972.
 Experience: Command and staff assignments, USARUER (Germany); electronics maintenance officer, 4th Infantry Division (Vietnam); MOS development officer, Southeastern Signal School, Fort Gordon.
- THAKURDESAI, SUDHAKAR G. (1972)** Architecture
 Diploma, Arch., Sir, J. J. College of Architecture, Bombay, India, 1966; M.Arch., Harvard University, 1971.
 Experience: Assistant architect, Vastu, Shilpa, Ahmedabad, India; assistant architect, Sert, Jackson & Associates, Cambridge, Massachusetts.
- THOMAS, GUY H., JR. (1968)** Graphic Communications
 B.S., California State Polytechnic College, 1953; M.A., 1971.
 Experience: Equipment technician, California State Polytechnic College; chief machinist, Union-Tribune Publishing Company, San Diego; head machinist, Magoffin Typographers, Hollywood and Evening Outlook, Santa Monica; machinist, Chicago Sun-Times; field engineer, Mergenthaler Linotype Company, Chicago and San Francisco.
- THOMAS, JOHN W. (1968)** Biological Sciences
 B.A., Los Angeles State College, 1957; Ph.D., University of Southern California, Los Angeles, 1968.
 Experience: Chemist, Atkinson Laboratory; public health microbiologist, Los Angeles City Health Department; teacher, Durate Unified School District; research associate, University of Southern California.
- THOMSON, DAVID H. (1946)** Biological Sciences
 B.S., University of Arizona, 1944, M.A., Claremont Graduate School, 1948; additional graduate study, Oregon State College and University of Oregon.
 Experience: Laboratory instructor, Pomona College; ranger-naturalist, Sequoia National Park.
- THRASHER, FRANK P. (1963)** Crop Science
 B.S., Montana State College, 1951; M.S., 1963.
 Experience: Recruit instructor, U. S. Navy; farmer-owner, Bozeman, Montana; research agronomist, Agricultural Research Service, U.S. Department of Agriculture, Bozeman, Montana.
- THURMOND, WILLIAM (1951)** Biological Sciences
 A.B., University of California, 1948; M.A., 1950; Ph.D., 1957.
 Experience: Instructor, San Mateo Junior College; associate in zoology, University of California; instructor, summer session, University of California, 1957-59; Director, National Science Foundation, Summer Science Training Program for secondary students, California State Polytechnic College; visiting professor, University of Frankfurt, Germany.

Faculty and Staff

TICE, RUSSELL L. (1965) Chemistry
B.S., Marshall University, 1960; Ph.D., University of California, Los Angeles, 1965.

Experience: Teaching and research assistant, University of California, Los Angeles; U.S. Navy.

TIMONE, BARNEY R. (1969) Assistant to the Dean of Students
B.A., Chico State College, 1965; M.A., Idaho State University, 1969.

Experience: Teacher, Chico Unified School District; head resident and placement interviewer, Idaho State University.

TOONE, HARMON (1952) Head, Dairy and Poultry
Science Department

B.S., University of Idaho, 1940; M.A., California State Polytechnic College, 1956.

Experience: Director of vocational agriculture at Moreland, Ucon, and Firth high schools, Idaho; superintendent, Firth High School, Idaho; director of vocational agriculture, Riverdale High School; special supervisor, Bureau of Agricultural Education.

TOWNSEND, NEAL R. (1965) Mathematics

B.S., Wisconsin State College, 1953; M.A., San Diego State College, 1961; Ph.D., Purdue University, 1972.

Experience: Teacher, San Bernardino City Schools, Grossmont Union High School District; assistant professor, Wisconsin State University, Stevens Point; graduate instructor, Purdue University; instructor, Hancock College.

TREMBLY, DEAN (1961) Counselor

A.B., Colorado College, 1933; M.A., 1946; Ed.D., University of Illinois, 1961.

Experience: Industrial personnel consultant, Human Engineering Laboratory, Fort Worth, Texas; testing and counseling, University of Illinois.

TROUTNER, WILLIAM R. (1942) Crop Science

Vocational Certificate, California State Polytechnic College, 1934; B.S., University of California, Davis, 1938.

Experience: Agriculture instructor, Pomona High School and Junior College; agriculture instructor and critic teacher, San Luis Obispo Senior High School.

TROY, BERNARD A. (1970) Education

B.A., University of Notre Dame, 1957; S.T.L., Universidad Catholica de Chile, 1961; M.A., University of Notre Dame, 1965.

Experience: Chaplain/Foreign Student Advisor, University of Notre Dame; chaplain, St. Charles Boys' Home, Milwaukee; curate, Diocese of Santiago de Veraguas, Santiago; teacher/counselor/school psychologist, Monrovia Unified School District.

TRUEX, JOSEPH W. (1954) Graphic Communications

B.S., California State Polytechnic College, 1952; M.S., South Dakota State University, 1966.

Experience: Floorman, San Luis Obispo Telegram-Tribune. Printer: Santa Maria Advertiser; Williams Press, Flushing, New York; H. W. Wilson Company, New York City, U. S. Navy.

TSENG, JAMES H. W. (1969) Electronic and Electrical Engineering

LL.B., National Taiwan University, Republic of China, 1950; LL.M., Southern Methodist University, Dallas, Texas, 1957; B.S., Illinois Institute of Technology, Chicago, Illinois, 1964; M.S., 1966.

Experience: Judge, Taitung and Taichung District Courts; secretary and section chief, Justice Department, Republic of China; teaching assistant, Illinois Institute of Technology; test engineer, Northern Indiana Public Service Corporation, Hammond, Indiana; research and development engineer, Research and Development Division, Advance Ross Electronics Corporation, Addison, Illinois; assistant professor, Purdue University Calumet Campus, Hammond, Indiana.

- TURNER, PEARL (1951)** Library
 A.B., San Jose State, 1937; M.S., University of Southern California, 1949; M.L.S., Texas Women's University, 1951; additional graduate study, University of Washington.
 Experience: Teacher in elementary schools, Visalia, Los Angeles, Riverside; officer, U. S. Navy.
- VALPEY, ROBERT G. (1972)** Dean, School of Engineering and Technology
 B.S., United States Military Academy, 1945; B.M.E., Cornell University, 1950; M.S., University of Colorado, 1958; Ph.D., University of Illinois, 1962.
 Experience: Officer, U.S. Air Force; instructor, U.S. Military Academy, West Point; instructor, U.S. Air Force Academy; chief, Turbo-machinery Section, Wright Air Development Center Equipment Laboratory; director, Launch Vehicle Section and Advanced Programs Section, Space Systems Division, U.S. Air Force; dean, School of Engineering, California State College, Fullerton. Registered professional engineer, Ohio.
- VAN DE VANTER, GORDON L. (1960-66) (1968)** Crop Science
 B.S., California State Polytechnic College, 1953; M.A., 1965; additional graduate study, University of California, Davis.
 Experience: Commercial vegetable grower, owner-manager. Contract logging and excavation operation. Aerographer, USNR.
- VAN LOBEN SELS, JOYCE L. (1971)** Placement Supervisor
 B.A., California State Polytechnic College, 1970.
 Experience: Placement interviewer, California State Polytechnic College.
- VANONCINI, LESLIE J. (1965)** Agricultural Management
 B.S., California State Polytechnic College, 1946; M.A., 1953; additional graduate study, University of California, Davis, University of California, Berkeley, University of Southern California.
 Experience: Director vocational agriculture, Santa Maria High School and Junior College; director work education, Santa Barbara County Schools; director counseling and guidance, Santa Maria High School; director adult education and dean, evening division, Allan Hancock College.
- VAN WYNGAARDEN, WILLEM L. (1965)** Physics
 B.S., McMaster University, 1961; M.S., University of Manitoba, 1964; additional graduate study, University of Manitoba.
 Experience: Instructor, Methodist College.
- VARNEY, ALVIN DAVID (1969)** Engineering Technology
 B.S., LeTourneau College, Longview, Texas.
 Experience: Machinist, Krause Corporation, Hutchinson, Kansas, LeTourneau College, Longview, Texas and U. S. Industries, Longview; trainee, Field Enterprises, Longview; product engineer, John Deere Company, Des Moines, Iowa, and Vernon, California.
- VARTAN, ROBERT P. (1967)** Business Administration
 B.A., University of Michigan, 1936; M.B.A., 1937; J.D., University of Toledo, 1955.
 Experience: Supervising senior, Price Waterhouse & Company; chief of audit section, financial analyst, adviser to Renegotiation Board, Detroit Ordnance District; instructor, University of Detroit; controller and assistant treasurer, Greer Hydraulics, Inc.; controller for Plymouth Body Plant, divisional controller for Airtemp Division, Chrysler Corporation; vice president-finance, assistant treasurer, assistant secretary, Dot Records, Inc.; vice president-finance, Ranwood Records, Inc.; controller, secretary and treasurer of ICC Van Nuys Skyways, Inc. and Golden West Airlines, Inc.; independent consultant service; C.P.A.

Faculty and Staff

VENERABLE, GRANT D., II (1972).....Chemistry
B.A., University of California, Los Angeles, 1965; M.S., University of Chicago, 1967; Ph.D., 1970.

Experience: Teaching assistant, research assistant, University of California, Los Angeles, and The University of Chicago; Argonne pre-doctoral fellow, The University of Chicago, U.S. Atomic Energy Commission; postdoctoral fellow radiobiology, University of California, Los Angeles; lecturer, California State College, Los Angeles; teacher, Duarte High School, Los Angeles.

VOELTZ, HERMAN C. (1965).....Head, History Department
B.A., University of Chicago, 1943; M.A., 1949; Ph.D., University of Oregon, 1960.

Experience: Instructor, 83 Div I and E School, Bad Ischl, Austria; assistant librarian, Civil Service, War Department, Austria; instructor and associate professor, Division of Continuing Education, University of Oregon; assistant professor, Oregon State University; associate professor, Western New Mexico University; U.S. Army.

VOLIN, SUZANNE L. (1970).....Child Development
B.S., South Dakota State University, 1968; M.S., Kansas State University, 1970.

Experience: Head Start teacher, Sisseton, South Dakota, and Kansas City, Missouri; graduate teaching assistant and assistant instructor, Kansas State University.

VORHIES, RALPH M. (1946).....Crop Science
B.S., University of Missouri, 1938; M.A., 1941; Ed.D., 1964.

Experience: Agriculture instructor at Belton and Couch High Schools, Missouri; instructor, Southeast State Teachers College, Cape Girardeau, Missouri; horticulture adviser, USAID Guatemala; officer, U.S. Navy.

VOSS, LARRY R. (1968).....Executive Assistant to the President
B.A., Sacramento State College, 1956; graduate study, Sacramento State College and California State College at Los Angeles.

Experience: Placement supervisor, Sacramento State College; assistant personnel officer, California State Department of Education, Sacramento; senior personnel analyst, Chancellor's Office, Trustees of the California State Colleges, Los Angeles; assistant director, U.S. Office of Education project: "Improvement of Personnel Administration in State Education Agencies", Los Angeles.

WAGNER, ORVIN E. (1969).....Physics
B.A., Walla Walla College, 1953; B.S., 1959; M.S., Arizona State University, 1963; Ph.D., University of Tennessee, 1968.

Experience: Teaching and research assistant, Arizona State University; manager of basic research, Electron Division, Controls Company of America; scientist, Lockheed Research Laboratories; instructor, Walla Walla College; NIH radiological health physics fellow, University of Tennessee and Oak Ridge National Laboratory; A.E.C. postdoctoral fellow at Oak Ridge National Laboratory.

WAHL, WILLIAM B. (1966-71) (1973).....English
A.B., San Francisco State College, 1953; M.A., 1954; Ph.D., University of Salzburg, Austria, 1973.

Experience: Teacher, College of San Mateo; Sequoia High School.

WAI, ANGLI (1967).....Child Development
A.B., M.A., Scarritt College, Nashville, 1953.

Experience: Instructor, Berea College, Berea, Kentucky; teacher, State University of Iowa and Randolph Macon Woman's College.

WALKER, HOWARD D. (1957).....Chemistry
B.A., New York University, 1947; M.S., 1948; Ph.D., U.C.L.A., 1955.

Experience: U.S. Public Health Service, postdoctorate fellow, American Meat Institute Foundation, University of Chicago; group leader, Veterans Hospital, Downey, Illinois; instructor, Northwestern University.

- WALKER, ISAAC N. (1967).....English
 B.S., Northwestern University, 1953; M.A., University of Texas, 1955; Ph.D., 1965.
 Experience: Teaching assistant, special instructor, University of Texas; instructor, Southwest Texas State College; instructor, Del Mar College, Corpus Christi; assistant professor, North Texas State University.
- WALKER, WALTER A. (1963).....Counselor
 A.B., New School for Social Research, 1950; graduate study, New York University.
 Experience: Supervising psychologist, Rockland County New York Center for Mental Health; psychotherapist, Rockland Consultation Center; certified psychologist, New York.
- WALL, LEONARD W. (1969).....Physics
 B.S., Louisiana Polytechnic Institute, 1963; Ph.D., Iowa State University, 1969.
 Experience: Physical science aide, U.S. Waterways Experiment Station; laboratory assistant, Louisiana Polytechnic Institute; graduate teaching assistant and research assistant, Iowa State University; assistant professor, University of Kansas.
- WALLACE, WILLIAM C. (1969).....Co-Director, Educational Opportunity Program
 B.S., California State Polytechnic College, San Luis Obispo, 1967.
 Experience: Group supervisor, senior group supervisor, senior youth counselor, and classification counselor, California Youth Authority, the Paso Robles School for Boys.
- WALTERS, DIRK R. (1969).....Biological Sciences
 B.S., Western Illinois University, 1965; M.A., Indiana University, 1966; Ph.D., 1969.
 Experience: Teaching associate, Indiana University; instructor, Orange County (New York) Community College.
- WALTERS, ROBERT W. (1970).....Program Counselor
 B.A., California State College, Fullerton, 1962; M.A., California Polytechnic State University, 1971.
 Experience: Activities advisor, University of Washington; director of student activities, athletics, foreign student affairs, Seattle Community College; director of student development, SCOPE Corporation, Stenner Glen.
- WARD, EDWARD JOHN (1970).....Architecture
 B.S., University of Massachusetts, 1962; M.U.P., Michigan State University, 1964.
 Experience: Research associate, School of Urban and Public Affairs, Carnegie-Mellon University; director, Planning & Research Division, Community Action, Pittsburg, Inc.; principal planner, Urban Renewal Division, National Capital Planning Commission, Washington, D.C.; planner, City Planning Department, Miami, Florida; planning technician, Michigan State Highway Department.
- WARD, WESLEY S. (1954).....Architecture
 B. of Arch., University of Southern California, 1953; graduate study, Spain.
 Experience: Officer, flight instructor, air installations, U.S. Air Force; draftsman-designer, Everett E. Parks, Architect; design responsibility, Benedict Beckler and Kochler, Architects and Engineers; architectural practice, design and research consultation, California, Madrid, Spain; Registered Architect, California.
- WARTEN, RALPH M. (1968).....Mathematics
 B.S., Brooklyn College, 1957; M.S. Purdue University, 1959; Ph.D., 1961.
 Experience: Research and teaching assistant, Purdue University; instructor, advisory mathematician, I.B.M. Corporation, Federal Systems Division; mathematician, I.B.M. Corporation, Scientific Center.
- WATERBURY, ARCHIE M. (1973).....Biological Sciences
 A.B., San Jose State College, 1966; M.A., 1968; Ph.D., University of California, Davis, 1972.
 Experience: Teaching assistant, lecturer, University of California, Davis.

Faculty and Staff

- WATSON, HAROLD J. (1964)** **Chemistry**
 A.B., Princeton University, 1944; A.M., University of Illinois, 1948; Ph.D., 1950.
 Experience: Assistant, University of Illinois; chemist, Texaco, Inc.; group leader, Dan River Mills, Inc., Chemical Consultant, Danville, Va.
- WEATHERBY, JOSEPH N., JR. (1968)** **Political Science**
 B.A., Baylor University, 1958; B.F.T., American Institute for Foreign Trade, 1961; M.A., Baylor University, 1962; Ph.D., University of Utah, 1968.
 Experience: International operations, Ford Motor Company; assistant professor, Bay de Noc College; summer, Fullbright, American University, Cairo, Egypt.
- WEBB, JAMES L. (1969)** **Men's Physical Education**
 B.S., University of North Dakota, 1962; M.S., 1963; Ph.D., University of Oregon, 1969.
 Experience: Graduate assistant, University of Oregon; public school teacher, Staples, Minnesota, and Grand Forks, North Dakota; lifeguard, swimming and diving instructor, Hatton, North Dakota.
- WEBER, BARBARA P. (1966)** **Home Economics**
 B.S., University of Nevada, 1951; M.A., California State Polytechnic College, 1968, additional graduate study, UCLA Extension, University of Nevada, California State Polytechnic College.
 Experience: Instructor, Allan Hancock College, Evening Division.
- WEBRE, NEIL W. (1969)** **Computer Science & Statistics**
 B.S., Louisiana State University, 1960; A.M., Harvard University, 1968; additional graduate study, Columbia University, University Munich.
 Experience: Assistant mathematician, Brookhaven National Laboratory; computer systems analyst, Columbia University; computing systems consultant, Max Planck Institute; applied mathematician, ABT Associates, Inc.
- WEBSTER, JAMES P., JR. (1964)** **Agricultural Engineering**
 B.S., California State Polytechnic College, 1953; graduate study, Cal Poly, Oregon State University.
 Experience: Dehydrator engineer, L. M. Lockhart Ranch; U.S. Army; engineering aid, junior civil engineer and assistant highway engineer, California Division of Highways; field survey chief and project engineer, Garing, Taylor, and Associates, Arroyo Grande; chief of party, Cal Poly AID Project, Zambia, Africa; farm buildings engineer, Land Use Services Division, Ministry of Rural Development, Lusaka, Zambia, Africa.
- WEINSTEIN, STEPHEN T. (1969)** **Mathematics**
 B.A., University of Southern California, 1960; M.A., 1965; Ph.D., 1972.
 Experience: Engineering planner and program analyst, North American Aviation, Space & Information Systems Division; teacher, Bell High School; instructor, East Los Angeles City College; teaching and research assistant, University of Southern California.
- WELTY, CHARLES J. (1971)** **Computer Science & Statistics**
 B.S., University of California, Berkeley, 1967; M.S., 1968.
 Experience: Technician, Amelco Semiconductor; transmission engineer, P. T. & T.; logical design engineer, I.B.M. Corporation; teaching assistant, University of California, Berkeley; instructor, Morehouse College; teaching fellow, University of California, Berkeley.
- WENDLING, HENRY, CPT. (1973)** **Military Science**
 B.S., College of Idaho, 1966; Field Artillery Officer Candidate School, 1967; Field Artillery Officer Advanced Course, 1971; graduate study, California Polytechnic State University, 1973.
 Experience: Battery executive officer, U.S. Army Training Center, Fort Sill; battery commander, U.S. Army Training Center, Fort Sill; artillery liaison officer and company commander, 199th Infantry Brigade, Vietnam.

- WENZL, MICHAEL J. (1969) English
 B.A., University of Oregon, 1961; M.A., 1965; Ph.D., University of New Mexico, 1969.
 Experience: Instructor, Arizona State College, University of New Mexico.
- WESSELS, HENRY (1970) Art
 B.S., Northern Illinois University, 1957; graduate study, Northern Illinois University, California State College, Long Beach.
 Experience: Teacher, Rockford, Illinois and La Mirada, California high schools; instructor, Orange Coast College, Cerritos College; owner, Studio-Gallery, Huntington Beach.
- WEST, HOWARD (1959) Associate Dean, Resources and Planning
 B.A., Pepperdine College, 1956; M.A., California State Polytechnic College, 1971.
 Experience: Apprentice reporter, Los Angeles Examiner; journalism instructor and acting director of public relations, Pepperdine College; editor, America's Builders; publications consultant, Southland Press; assistant to President, director, International Education.
- WEST, JOHN W. (1968) Associate Dean, School of Agriculture
 and Natural Resources
 B.S.A., University of Tennessee, 1947; M.S., 1948; Ph.D., Purdue University, 1951.
 Experience: U.S. Army; assistant director of research, Security Mills, Knoxville, Tennessee; associate professor of Poultry Science, Mississippi State University; professor and head, Department of Poultry Science, Oklahoma State University.
- WESTESEN, GERALD L. (1965) Agricultural Engineering
 B.S., University of California, Davis, 1958; M.S., 1963.
 Experience: Junior land and water use analyst, California State Department of Water Resources; engineer and superintendent, Clear Lake Water Company, Woodland; officer, U.S.A.R.
- WESTOVER, JAMES D. (1971) Chemistry
 B.S., Arizona State College, 1960; M.S., 1962; Ph.D., Brigham Young University, 1966.
 Experience: Analyst, research assistant, Arizona State College; research and teaching assistant, Brigham Young University; research chemist, E. I. Dupont de Nemours & Company, Kinston, North Carolina; lecturer, California State Polytechnic College, San Luis Obispo; teacher, Paso Robles High School.
- WHALEY, GLENN V. (1963) Library
 B.A., Carroll College, 1949; M.L.S., University of Wisconsin, 1953; M.A., Drake University, 1965.
 Experience: Reference librarian, Drake University; librarian, Milwaukee Public Library.
- WHALLS, MARVIN J. (1968) Head, Natural Resources Management
 Department
 B.S., Michigan State University, 1951; M.S., University of Michigan, 1957; Ph.D., 1970.
 Experience: Fishery research biologist, Hunt Creek Trout Research Station and research fellow, Institute for Fisheries Research, Michigan Department of Conservation; fishery biologist in charge of fisheries management and development, southern California, California Department of Fish and Game.
- WHEATLEY, PATRICK O. (1970) Mathematics
 B.A., St. Mary's Seminary, 1956; M.S., The University of Chicago, 1963; Ph.D., University of Houston, 1970.
 Experience: Aerospace engineer, NASA, MSC, Houston, Texas; teaching assistant, University of Houston; teacher, Strake Jesuit Preparatory School, Houston, Texas.

Faculty and Staff

WHEELER, ERNEST J., JR. (1969).....Men's Physical Education
B.A., University of Washington, 1961; M.S., University of Southern California, 1966.

Experience: Teacher and assistant basketball coach, Compton Junior College; high school coach and teacher, Anaheim.

WHEELER, ROBERT R. (1961).....Animal Science
B.S., Colorado State University, 1952; M.S., 1955, Ph.D., Oregon State University, 1962.

Experience: Irrigated farming; ranching; graduate assistant and graduate fellow in animal nutrition, Oregon State University; Junior animal husbandman, Oregon Agricultural Experiment Station.

WHIPPLE, OMER K. (1956).....Chemistry
A.B., Dartmouth College, 1936; M.A., Columbia University, 1938.

Experience: Biochemical research chemist, Long Island College of Medicine; instructor in chemistry, Norwich University; research chemist, Vermont Bureau of Industrial Research; professor of quantitative analysis, University of Tulsa; chemical consultant, Tulsa, Oklahoma.

WHITE, MARY LOU (1961).....Head, Women's Physical Education Department
B.S., Oregon State University, 1946; M.S., Washington State University, 1953; additional graduate study, University of Southern California, University of Oregon.

Experience: St. Helens, Oregon, High School instructor; physical education instructor, Clark College, Vancouver, Washington.

WHITSON, MILO E. (1947).....Mathematics
Ph.B., Washburn College, 1937; M.A., George Peabody College for Teachers, 1940; Ed.D., University of Southern California, 1949.

Experience: Teacher and administrator, Kansas; officer, U.S. Navy; lecturer, mathematics, University of Southern California.

WIGHT, HEWITT G. (1952).....Chemistry
B.S., University of Utah, 1943; Ph.D., University of California, 1955.

Experience: Teaching assistant, University of Utah, St. Martin's College, and the University of California; officer, U.S. Army.

WILEY, J. BARRON (1956).....Education
B.S., University of Denver, 1940; M.B.A., 1948; Ed.D., Indiana University, 1955.

Experience: Accounting and business administration, various firms; officer, U.S. Air Force; head, department of business education, Colorado Woman's College; assistant professor of air science, Indiana University.

WILEY, RICHARD C. (1946).....Head, Metallurgical Engineering Department
Special engineering courses, Stanford University; industrial arts training, San Jose State College and University of California.

Experience: Master mechanic and welder, Utah Construction Company; welding instructor, Sacramento Junior College; Palo Alto, San Francisco, and San Jose school systems; senior welding engineer, Joshua Hendy Iron Works; field engineer, Bechtel Corporation; welding metallurgy consultant, Westinghouse Corporation; X-ray Engineering International; Linde Company, New York; registered professional engineer, California.

WILK, EDWARD A. (1966).....Library
B.A., Western Michigan University, 1965; M.S.L., 1966.

Experience: I.B.M. operator, Allstate Insurance Company; salesman, Arts International, Detroit, Michigan.

- WILKS, MAURICE L. (1966)** Architecture
 B.Arch., Yale University, 1952.
 Experience: Private practice, California, Ohio, Utah; consulting architect for City of Hope Medical Center; project architect, 20th Century-Fox, Century City Studios; project architect and senior designer, Victor Gruen Associates; design consultant, Charles Matcham, F.A.I.A.; designer, P. J. Ellerbroek and Westcott & Mapes; assistant professor, University of Kansas; associate professor, University of Utah. Registered architect, California, Ohio, Utah.
- WILLIAMS, GRAYDON J. (1970)** Music
 B.M., New England Conservatory of Music, 1957; M.M., 1959.
 Experience: Associate professor, The College of the Ozarks.
- WILLIAMS, ROBERT E. (1957)** Architecture
 B.S., California State Polytechnic College, 1954.
 Experience: Civil engineer-designer, California Division of Highways; civil engineer, Hornkohl Laboratories; President, Central Coast Laboratories. Registered engineer, California.
- WILLIAMS, ROBERT F. (1971)** Business Administration
 B.S.M.E., Rice Institute, 1939; graduate study, University of Cincinnati, University of California at Los Angeles.
 Experience: Lecturer, University of California, Los Angeles; lecturer, Los Angeles State College; lecturer, Royal Technical University, Stockholm; lecturer, Gothenberg Graduate School of Business, Sweden; lecturer, Copenhagen University of Commerce; president, Parsons & Williams, Inc., Management Consultants; chief industrial engineer, Crosley Division, Avco, Cincinnati, Ohio.
- WILLIAMSON, DANIEL P. (1970)** Economics
 B.A., University of California, Santa Barbara, 1966; Ph.D., University of California, San Diego, 1973.
 Experience: Associate in economics, University of California, San Diego; teaching assistant, University of California, San Diego; research assistant, University of California, San Diego.
- WILLIAMSON, DAVID G. (1968)** Chemistry
 B.A., University of Colorado, 1963; Ph.D., University of California at Los Angeles, 1966; postdoctoral fellow, National Research Council of Canada.
 Experience: Research assistant, University of California; chemist, National Bureau of Standards, Boulder, Colorado.
- WILLS, MAX THOMAS (1967)** Chemistry
 B.S., University of Puget Sound, 1961; Ph.D., University of Washington, 1965.
 Experience: Chemist, Oil and Refining Co.; laboratory technician, General Mills Inc.; teacher and research assistant, University of Washington; research chemist, Shell Development Co.
- WILLSON, IRWIN A. (1958)** Education
 B.A., University of North Dakota, 1930; M.A., University of Denver, 1940; additional graduate study, University of Denver, 1948-1958.
 Experience: Teacher, high schools, North and South Dakota; principal and director of elementary education, Canon City, Colorado; counselor, University of Denver; director of curriculum, Stanislaus County Schools, Modesto; superintendent of schools, Fall River Mills; assistant professor, San Diego State College; associate professor, chairman of the division of education and psychology, director of teacher education, Westmont College.
- WILSON, HAROLD O. (1936-41) (1946)** Administrative Vice President
 B.S., University of California, 1932; graduate study, Fresno State College, University of California at Los Angeles.
 Experience: Director of agriculture, Excelsior Union High School, Norwalk; instructor of agriculture and head, swine department, California Polytechnic; regional supervisor, agricultural education, State Department of Education, California; dean, Voorhis Unit, California State Polytechnic College; Executive Dean, San Luis Obispo.

Faculty and Staff

- WILSON, MALCOLM W. (1968)** Education
 B.A., Western State College, 1962; M.A., 1964.
 Experience: Teacher, Nucla Grade School, Colorado; Shenandoah Junior High, Miami-Dade Junior College; Canyon del Oro Junior High, Tucson; graduate assistant, instructor, University of Arizona.
- WILSON, WALTER D. (1969)** Physics
 B.S., University of California, Berkeley, 1957; Ph.D., 1966.
 Experience: Researcher, University of California, Berkeley; member of technical staff, Aerospace Corporation, San Bernardino, and Aerojet General Nucleonics, San Ramon, California.
- WILVERT, CALVIN H. (1973)** Social Sciences
 B.A., University of California, Los Angeles, 1963; M.A., University of California, Berkeley, 1967; Ph.D., 1971.
 Experience: Lieutenant, U.S. Army; assistant professor, University of Vermont.
- WINGER, DONLEY J. (1963)** Electronic and Electrical Engineering
 B.S.E.E., University of North Dakota, 1960; M.S.E.E., 1963.
 Experience: Graduate assistant and instructor, University of North Dakota.
- WINNINGHOFF, PHILIP FRANCIS (1972)** Architecture
 B.Arch., Montana State College, 1962; M.S., Montana State University, 1972.
 Experience: Draftsman, H. E. & J. W. Kirkemo, Missoula, Montana; draftsman, Winston & Winston, San Jose, California; modelmaker, Scale Models Unlimited, Palo Alto; draftsman, Welton Becker & Associates, San Francisco; research assistant, Department of Computer Sciences, Montana State University; instructor, School of Architecture, Montana State University.
- WINSLOW, CARLETON MONROE, JR. (1969)** Architecture
 B. Arch., University of Southern California, 1947; M.A., 1959.
 Experience: Private practice, California and Hawaii; associate professor of architecture, University of Southern California.
- WIRSHUP, ARTHUR D. (1952)** Mathematics
 B.S., City College of New York, 1931; M.A., Columbia University, 1936; M.S., Oregon State College, 1951; Ph.D., 1963.
 Experience: Teaching fellow in mathematics, Oregon State College; instructor, Multnomah College; radar officer, U.S. Army; National Science Foundation summer staff, Oregon State University.
- WOLCOTT, VICTOR F. (1962)** Business Administration
 B.S., Stanford University, 1947; M.B.A., 1949.
 Experience: Security analyst, Crocker First National Bank of San Francisco; financial analyst, Fibreboard Products, Inc., and Fibreboard Paper Products Corporation; extension instructor, University of California.
- WOLF, FREDERICK E. (1971)** Coordinator, Special Programs
 B.A., Pomona College, Claremont, 1962; M.A., California State College, Los Angeles, 1968; additional graduate study, California Polytechnic State University.
 Experience: Stage technician, The Garrison Theater, Claremont Graduate School; staff technician, Drama Department, California State College, Los Angeles; instructor, California Lutheran College Drama Department; College Union director and coordinator of campus activities, California Lutheran College; U.S. Army.
- WOLF, LAWRENCE J. (1970)** Director, Financial Aids
 B.A., University of Southern California, 1957; LL.B., La Salle University, 1967; M.A., California Polytechnic State University, 1973.
 Experience: Coordinator of Student Discipline, Financial Aid Counselor, California Polytechnic State University; executive assistant, supervisor-Manufacturing Controls, Space Division, North American Rockwell Corp., Downey; district manager, Chrysler-Plymouth Division, Chrysler Motors Corp.; zone manager, Ford Division, Ford Motor Company.

- WOLFF, PAUL (1971)** Architecture
 B. Arch., University of California at Berkeley; graduate study, Academy of Art and Architecture.
 Experience: Self-employed, Palo Alto; partner, Arutunian, Kinney, Wolff Associates, Palo Alto; project architect, Nobler & Chen, AIA, Redwood City; project architect, Keller & Daseking, AIA, Palo Alto; project architect, Janssen, Daseking & Keller, AIA, Menlo Park; architectural designer, Hawley & Peterson, AIA, Palo Alto; architectural designer, Clark, Stromquist, Potter & Ehrlich, AIA, Palo Alto; architectural draftsman and designer, Richard J. Neutra, FAIA; U.S. Army; architectural designer, Jonsson & Jonsson, Stockholm, Sweden. Licensed architect, California.
- WOODWORTH, JOHN A. (1949)** Mathematics
 A.B., Hastings College, 1939; M.S., University of Southern California, 1948; additional graduate study, University of California, Berkeley.
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